

AD-773 743

SMALL SCALE GAP TEST (SSGT) DATA  
COMPILATION: 1959-1972. VOLUME I.  
UNCLASSIFIED EXPLOSIVES

James N. Ayres, et al

Naval Ordnance Laboratory  
White Oak, Maryland

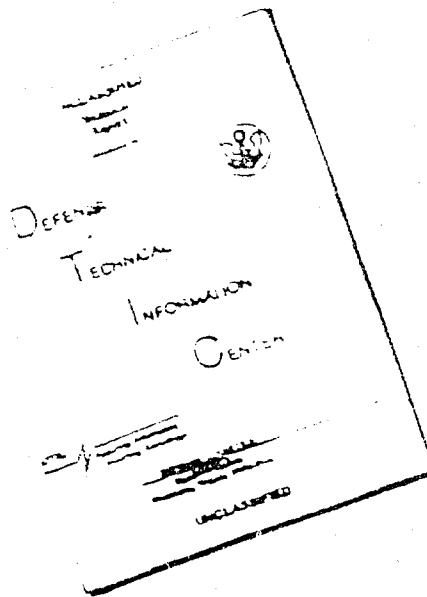
26 October 1973

DISTRIBUTED BY:

**NTIS**

National Technical Information Service  
U. S. DEPARTMENT OF COMMERCE  
5285 Port Royal Road, Springfield Va. 22151

# DISCLAIMER NOTICE



THIS DOCUMENT IS BEST  
QUALITY AVAILABLE. THE COPY  
FURNISHED TO DTIC CONTAINED  
A SIGNIFICANT NUMBER OF  
PAGES WHICH DO NOT  
REPRODUCE LEGIBLY.

REPRODUCED FROM  
BEST AVAILABLE COPY

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

| REPORT DOCUMENTATION PAGE  |                       | READ INSTRUCTIONS<br>BEFORE COMPLETING FORM  |
|--|-----------------------|--|
| 1. REPORT NUMBER<br>NOLTR 73-132   | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER<br><b>AD-773 743</b>   |
| 4. TITLE (and Subtitle)<br>Small Scale Gap Test (SSGT) Data<br>Compilation : 1959-1972 Volume I<br>Unclassified Explosives   |                       | 5. TYPE OF REPORT & PERIOD COVERED<br>Final  |
| 7. AUTHOR(s)<br>James N. Ayres, Louis J. Montesi,<br>Ronald J. Bauer   |                       | 6. PERFORMING ORG. REPORT NUMBER   |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>Naval Ordnance Laboratory<br>White Oak<br>Silver Spring, Maryland 20910   |                       | 10. PROGRAM ELEMENT, PROJECT, TASK<br>AREA & WORK UNIT NUMBERS<br>ORD-332-004-092-1-UF-<br>354-314<br>NOL-787/NASA T-32602 (G) |
| 11. CONTROLLING OFFICE NAME AND ADDRESS<br>Naval Ordnance Systems Command<br>Washington, D.C. 20360  |                       | 12. REPORT DATE<br>26 October 1973   |
| 14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)  |                       | 13. NUMBER OF PAGES<br><b>vi + 376</b>   |
|  |                       | 15. SECURITY CLASS. (of this report)<br>Unclassified   |
|  |                       | 15a. DECLASSIFICATION/DOWNGRADING<br>SCHEDULE --   |
| 16. DISTRIBUTION STATEMENT (of this Report)<br><br>Approved for public release; distribution unlimited   |                       |  |
| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)<br><br>Unclassified   |                       |  |
| 18. SUPPLEMENTARY NOTES  |                       |  |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br>Steel Dent Output<br>Explosives<br>Density<br>Small Scale Gap Test<br>Explosives Properties<br><br>Reproduced by<br>NATIONAL TECHNICAL<br>INFORMATION SERVICE<br>U. S. Department of Commerce<br>Springfield VA 22151  |                       |  |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br>Over forty different explosives and types of explosives compositions have been fired in the Small Scale Gap Test (SSGT) by the Initiation Research Group at the Naval Ordnance Laboratory (NOL) during the period 1959 to 1972. Many times there have been: replicate firing, firing at high and low temperatures, batch-to-batch variational studies, tests of influence of composition on sensitivity, etc. |                       |  |

DD FORM 1473

JAN 73

EDITION OF 1 NOV 65 IS OBSOLETE  
S/N 0102-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Block No. 19

Secondary Explosives  
Heat Resistant Explosives  
Plastic-Bonded Explosives  
Booster Explosive  
Varicomp Explosives

Block No. 20

These data -- over 500 data points derived from over 12,000 shots have been compiled into the present document in a manner designed to make the data readily available to the reader. Test methods have been described. A minimal amount of discussion of the data has been included to demonstrate some of the ways the data can be used. This report is in two volumes of which this is Volume I.

19 UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)



SMALL SCALE GAP TEST (SSGT) DATA  
COMPILATION; 1959-1972

Volume I Unclassified Explosives

Prepared by:  
J. N. Ayres  
L. J. Montesi  
P. J. Bauer

ABSTRACT: Over forty different explosives and types of explosives compositions have been fired in the Small Scale Gap Test (SSGT) by the Initiation Research Group at the Naval Ordnance Laboratory (NOL) during the period 1959 to 1972. Many times there have been: replicate firing, firing at high and low temperatures, batch-to-batch variational studies, tests of influence of composition on sensitivity, etc. These data -- over 500 data points derived from over 12,000 shots have been compiled into the present document in a manner designed to make the data readily available to the reader. Test methods have been described. A minimal amount of discussion of the data has been included to demonstrate some of the ways the data can be used. This report is in two volumes of which this is Volume I.

EXPLOSIONS DYNAMICS DIVISION  
EXPLOSIONS RESEARCH DEPARTMENT  
NAVAL ORDNANCE LABORATORY  
WHITE OAK, MARYLAND

26 October 1973

Small Scale Gap Test (SSGT) Data Compilation; 1959-1972  
Volume I: Unclassified Explosive Data

The present report is a data compilation of the results of many Small-Scale Gap Tests, and should be of use in designing explosive trains of many types and of providing basic data for the assessment of the safety and reliability of such trains or components thereof. The compilation is far from complete, and for that reason has been published in a side-stitched prepunched format. At the option of the user, this document can be unstapled and put into standard three ring binders (four and one-quarter inches on centers) to aid in using (by keeping the document open at the point of use) and to aid in updating and augmenting by the replacement by or insertion of pages that will from time to time be sent to the holder of this document.

The work reported herein was supported by many projects, however the majority was done under:

- (1) "Explosion Initiation and Safety", ORD-332-004-092-1-UF-354-314, and
- (2) "The Investigation of High and Low Temperature Resistant Explosive Devices" (Work conducted for NASA, Manned Spacecraft Center, Houston, Texas) under Task NOL-787/NASA T-32602 (G)

The identification of commercial materials implies no criticism or endorsement of them by the Naval Ordnance Laboratory.

The total effort involved is a summation of many different activities involving the tedious, repetitious handling of inert structures and live explosives, countless operations of checking and rechecking, fastidious attention to manifold detail, development and refinement of procedures and techniques. It is impossible to quantify the importance and amount of effort of the contributors. Instead we will merely list in alphabetical order the scientists, technicians, and ordnancemen who have contributed directly and significantly to the work.

|             |  |
|-------------|--|
| Scientists  | J. Ayres, R. Bauer, C. Dieter, L. Hampton, H. Jones,<br>E. Kilmer, B. Meleski, L. Montesi, J. Murphy |
| Technicians | C. Goode, C. Randall   |

Ordnancemen

L. Bilbo, B. Brooks, T. Brown, A. Cheswick,  
E. Coburn, D. Crump, C. Davis, J. Dorsey, J. Farr,  
W. Fleming, R. Funk, J. Gurick, B. Holland,  
J. Homiak, W. Johnson, L. Jones, P. Layne,  
J. Manning, E. Morgan, E. Murray, L. Murphy,  
E. Nacke, J. Oliphant, J. Pennypacker, B. Poole,  
J. Robinette, F. Rugieri, O. Sauser, S. Stackhouse,  
B. Swigert, G. Thomas, P. Thomas, W. Thornton,  
E. Tyree, O. Ware, F. Bapatocki.

In addition, the authors wish to acknowledge the assistance and cooperation received from R. Canter, J. Carson, E. Grove, J. Jarboe, L. Lord, K. Smith and D. West of the Secretarial Services Branch who typed and "proofed" the text and cables of this report.

The two technicians: Goode and Randall, deserve special mention, for without their unremitting vigil and care on a day-by-day basis overseeing the vast number of detailed steps -- this work would not have been done.

This report is divided into two volumes of which this is Volume I.

ROBERT WILLIAMSON II  
Captain, USN  
Commander



C. J. ARONSON  
By direction

## CONTENTS

|   | Page |
|---|------|
| 1. SCOPE OF REPORT . . . . .  | 1    |
| 2. BACKGROUND . . . . .   | 2    |
| THUMB-NAIL HISTORY. . . . .   | 2    |
| DISTRIBUTION FUNCTION . . . . .   | 4    |
| THE HANDLING OF SCATTERED GO/NO-GO DATA . . . . .                           | 4    |
| SSGT OUTPUT DETERMINATION BY STEEL DENT<br>MEASUREMENT . . . . .            | 5    |
| THE CRITERION OF FIRE . . . . .   | 5    |
| DATA REDUCTION, GENERAL DESCRIPTION . . . . .                               | 8    |
| DENT BLOCK/HARDNESS CORRECTION. . . . .                                     | 8    |
| PROCESSING OF SSGT DATA . . . . .   | 11   |
| PROCESSING OF SSGT(A) DATA. . . . .   | 11   |
| 3. DATA PRESENTATION. . . . .   | 12   |
| PAGINATION SCHEME . . . . .   | 12   |
| MODES OF EXPANSION. . . . .   | 15   |
| DETAILS OF TYPE 1 DATA PAGE (BASIC DATA, AND<br>DBg VS KPSI PLOT) . . . . . | 15   |
| EXPLANATION OF APPENDIX H (Ancillary Tables) . . . . .                      | 17   |
| ADMONITORY NOTE . . . . .   | 17   |
| X NUMBERS, ID NUMBERS, Z NUMBERS . . . . .                                  | 17   |
| STANDARD LOADING AND TESTING CONDITIONS . . . . .                           | 18   |
| SSGT FIRING AT NON-AMBIENT TEMPERATURES . . . . .                           | 18   |
| PLOT OF DBg VS KPSI . . . . .   | 20   |
| PLOTS OF DBg VS $\rho$ AND $\rho$ VS KPSI . . . . .                         | 20   |
| PLOT OF "BAREFOOT DENT" VS KPSI . . . . .                                   | 20   |
| PLOTS OF DENT OUTPUT VS DBg . . . . .                                       | 20   |
| A REASON TO WORRY . . . . .   | 21   |
| 4. PRELIMINARY VALIDATION OF SSGT(A) . . . . .                              | 22   |
| COST OF SSGT & SSGT(A) . . . . .  | 22   |
| A STUDY OF DONOR OUTPUT . . . . .   | 23   |
| CHANGING THE DETONATOR . . . . .  | 23   |
| BRASS FOR SSGT BODIES . . . . .   | 28   |
| 5. UTILITY OF DATA . . . . .  | 29   |
| CH-6 STUDIES . . . . .  | 29   |
| DATB STUDIES . . . . .  | 29   |
| RDX/STEARIC ACID STUDIES . . . . .  | 34   |

CONTENTS (Cont)

|                            | Page |
|----------------------------|------|
| 6. FINAL REMARKS . . . . . | 39   |
| REFERENCES . . . . .       | 40   |

ILLUSTRATIONS

| Figure | Title   | Page |
|--------|---|------|
| 1      | Comparison of the SSGT and SSGT(A) Configuration . . .  | 3    |
| 2      | Typical Data Records, Comparing the Bruceton and<br>the Maximum Likelihood Logit Analyses . . . . .                     | 6    |
| 3      | Effect of Shock Strength From Donor on Acceptor<br>Output (SSGT Configuration) . . . . .                                | 7    |
| 4      | Interconversions Between DPH Number (Diamond-<br>Pyramid Hardness) and Rockwell Hardness . . . . .                      | 9    |
| 5      | Dent vs Hardness, Comparison of Recent Data<br>With Original Empirical Correction Equation . . . . .                    | 10   |
| 6      | The Elements of a Complete Data Pack . . . . .  | 14   |
| 7      | Representation of an Initial Page of Any Data<br>Pack . . . . .   | 16   |
| 8      | Experimental Arrangement for the Determination of<br>the Sensitivity of Explosives at Various<br>Temperatures . . . . . | 19   |
| 9      | Small-Scale Gap Test Measurements of Sensitivities<br>of Various CH-6's as a Function of Charge<br>Density . . . . .    | 30   |
| 10     | Composite Plot of All DATB Data Showing<br>Sensitivity vs Loading Pressure . . . . .                                    | 31   |
| 11     | Composite Plot of All DATB Data Showing<br>Sensitivity vs Density . . . . .   | 32   |
| 12     | Composite Plot of DATB SSGT Loading<br>Compressibility Data . . . . .   | 33   |
| 13     | DATB (X315) Time-Shift (1960 to 1967) of<br>Sensitivity vs Loading Pressure . . . . .                                   | 35   |
| 14     | DATB (X315) Time-Shift (1960 to 1967) of<br>Sensitivity vs Density . . . . .  | 36   |
| 15     | DATB (X315) Time-Shift (1960 to 1967) of<br>Density vs Loading Pressure . . . . .                                       | 37   |

CONTENTS (Cont)

TABLES

| Table | Title  | Page |
|-------|--|------|
| 1     | Explanation of Organization and Pagination of Appendices B, C, D, E, F, and G . . . . .                                      | 13   |
| 2     | A Selection of Steel Dent Output Data for SSGT Donors . . . . .  | 24   |
| 3     | Comparison of SSGT and SSGT(A) Donors by Steel Dent Output Readings . . . . .  | 26   |
| 4     | Comparison of SSGT and SSGT(A) Donors by Response of Yellow Tetryl Acceptors Loaded at 10 KPSI at Two Shock Levels . . . . . | 27   |

APPENDIX A INDICES

|           |  |     |
|-----------|--|-----|
| TABLE A-1 | ALPHABETIC INDEX TO APPENDICES B THROUGH G . . . . . | A-1 |
|-----------|--|-----|

|           |  |     |
|-----------|--|-----|
| TABLE A-2 | SYNOPTIC INDEX TO APPENDICES B THROUGH G . . . . . | A-3 |
|-----------|--|-----|

|           |                              |     |
|-----------|------------------------------|-----|
| TABLE A-3 | LIST OF DATA PACKS . . . . . | A-4 |
|-----------|------------------------------|-----|

APPENDIX B INITIATING EXPLOSIVES

APPENDIX C BOOSTER & WARHEAD EXPLOSIVES

APPENDIX D THERMALLY STABLE EXPLOSIVES

APPENDIX E PLASTIC-BONDED EXPLOSIVES

APPENDIX G VARIABLE COMPOSITION SERIES

APPENDIX H ANCILLARY INFORMATION

|           |   |     |
|-----------|---|-----|
| TABLE H-1 | PROCEDURES TO COMPUTE THE SHOCK STRENGTH NEEDED TO CAUSE A RESPONSE OF A PARTICULAR PROBABILITY . . . . . | H-1 |
|-----------|---|-----|

|           |   |     |
|-----------|---|-----|
| TABLE H-2 | BARRIER THICKNESS (MILS) AS A FUNCTION OF SHOCK STRENGTH FOR DBq RANGE 1.00 to 5.99 . . . . . | H-2 |
|-----------|---|-----|

|           |  |     |
|-----------|--|-----|
| TABLE H-3 | BARRIER THICKNESS (MILS) AS A FUNCTION OF SHOCK STRENGTH FOR DBq RANGE 6.00 to 10.99 . . . . . | H-3 |
|-----------|--|-----|

|           |  |     |
|-----------|--|-----|
| TABLE H-4 | BARRIER THICKNESS (MILS) AS A FUNCTION OF SHOCK STRENGTH FOR DBq RANGE -4.0 to +14.9 . . . . . | H-4 |
|-----------|--|-----|

|           |  |     |
|-----------|--|-----|
| TABLE H-5 | DETAILED TABLE OF PROBABILITIES AS A FUNCTION OF THE LOGISTIC VARIATE, L . . . | H-5 |
|-----------|--|-----|

## 1. SCOPE OF REPORT

1.1 The purpose of this report is to make available, as a compendium, Small Scale Gap Test (SSGT) sensitivity data obtained by the Initiation Research Group at the Naval Ordnance Laboratory since the inception of the test. The test itself will be described, as also the significance of each of the types of information on the data sheets. Some minimal discussion of the data will be used (1) to illustrate the stability of the SSGT system over the period; (2) to show some of the ways that the data can be used, and (3) some of the frustrating manifestations that on occasion occur. The report is in loose-leaf form to permit updating, corrections and the incorporation of new data.

1.2 We point out that this is a compilation of over a decade of work by nearly three dozen engineers, technicians and ordnancemen. The work was done for many different projects and for a variety of uses; much of the data have been reported in relatively inaccessible documents. We therefore have pulled the information into one place and have ignored, in general, any previous publications. However, should the reader encounter the same data in other sources and find, by comparison, that the two do not agree, the data in this report should be taken to supersede any published previously. This is because we have gone back to the original "load orders", and loading and firing data, and have applied the latest computational and statistical techniques for reducing the data.

1.3 There are a number of areas of information which are only partially complete at the date of first publication: (1) chemical source information, including vendor, batch or lot identification, date of manufacture, chemical analysis, sieve analysis, etc.; (2) transformations of the data as aids in comprehension or use, e.g., plots of sensitivity versus density (or versus percent of theoretical maximum density), plots of density versus loading pressure, batch-to-batch variational studies, etc. In the future we hope, as time and money permit, to augment the present report by publishing supplementary pages of such data to be interleaved at appropriate points. It is for this reason that the report is published in a loose-leaf form.

## 2. BACKGROUND

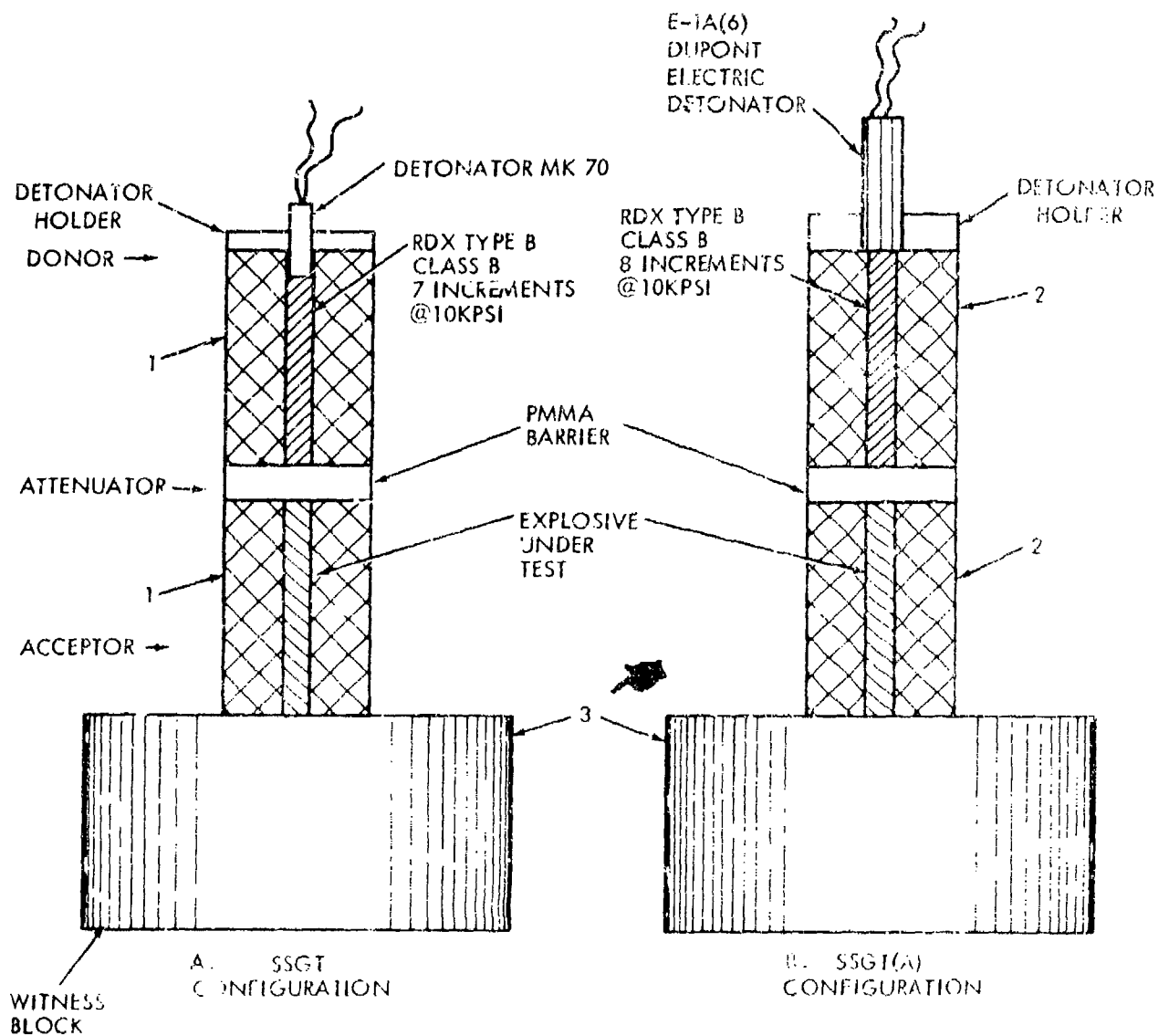
2.1 THUMB-NAIL HISTORY. Standardization of the Small Scale Gap Test began in June 1959. The test as it was reported<sup>1</sup> in 1961 has been changed in a few minor details which will be described later in this report. Data obtained at any time throughout this period are held to be of equal validity since we believe that no essential detail of the test has been altered. Through the years we have applied certain advanced statistical techniques which in turn have permitted refinements which should reduce certain types of experimental error (paragraphs 2.3 to 2.10). The SSGT or some variant of it has been called out in specifications for a number of military explosives to assure explosive sensitivity and output performance. Experience at NOL and other laboratories has shown certain difficulties in meeting some of the requirements originally established for the SSGT. Therefore, we have decided to establish more realistic requirements. Also, cost reductions can be realized by changing the detonator and the donor-loading method. The new detonator is also much less susceptible than the old one to unintentional initiation by electrostatic discharge in the leads-to-case mode.

2.2 The new version of the SSGT, incorporating the above-mentioned changes, is designated SSGT(A); its detailed description is given in Section 4. Figure 1 compares the SSGT and SSGT(A) arrangements. The specific changes which go into the SSGT(A) are:

- a. Specifies easier-to-get brass for the test bodies;
- b. Opens up the steel-dent output limits for the loaded donors, and at the same time eliminates hardness corrections on output readings of the donors;
- c. Calls for flush loading of donors; and
- d. Uses E-1A(6) DuPont Electric Detonator in lieu of Detonator Mk 70.

1. References are listed on page 40.





- 1 SSGT BODY (BRASS: QQ-B-626, COMP 11)
- 2 SSGT BODY (BRASS: QQ-B-626, COMP 11 OR COMP 22)
- 3 STEEL DENT BLOCK 3.00" O.D. X 1.50"; NAVORD DRAWING NO. 2426916 (PC.1)

FIG. 1 COMPARISON OF THE SSGT AND SSGT (A) CONFIGURATION

2.3 Statistical techniques for treatment of the data have gone through considerable evolution. At first, the Bruceton<sup>2,3</sup> "stair-step" test and analytical procedures were used. There are three features of the above procedures which have been modified during the time span of this report; initially they were:

- a. The probability of functioning was assumed to be a normally distributed (Gaussian) function of the shock intensity.\*
- b. The test levels had to be equally spaced in the shock-stimulus domain.
- c. The "criterion of fire" in the go/no-go testing has been taken to be one half of the zero-gap steel dent output (corrected for block hardness) during the particular Bruceton firing test.

2.4 DISTRIBUTION FUNCTION. For a number of reasons the Gaussian distribution function has been replaced by the Logistic distribution function.<sup>4</sup> Section 5 of reference 5 gives a detailed description and comparison of the two distributions and an in-depth discussion of the use of GO/NO-GO statistics in explosives testing, but no discussion of why we have chosen the Logistic distribution function. References 6, 7, and 8 deal with the estimation of high and low probability firing levels... one of the major uses of SSGT data. Although these three reports deal specifically with examples from the field of Electro-Explosive Device (EED) sensitivity, the concepts are fully valid when dealing with shock sensitivity determinations. In particular, (1) the problems with small sample size Brucetons (anything under 100 shots is considered "Small Sample Size"), and (2) the extra conservatism inherent in using the logistic distribution, are discussed. In addition to giving more conservatism in safety and reliability estimates, and also being probably more representative of real-life explosive systems than the Gaussian distribution, the logistic distribution is more readily adaptable to high-speed computer programming.

2.5 THE HANDLING OF SCATTERED GO/NO-GO DATA. The inherent assumption of the Bruceton analytical method -- that all the tests at a given level were actually at that level -- is an unavoidable source of imprecision. The PMMA\*\* gap spacers, being molded or machined to practical tolerances, can have a variability in thickness which is appreciable compared to the step size. Following the original work of Golub and Grubbs,<sup>9</sup> which assumed the Gaussian probability domain, we have developed a method for treating scattered data in the logistic probability domain.<sup>10</sup>

2.6 Not only are we able to use the Logistic probability distribution function, but no longer are we constrained to testing at discrete levels. We use the exact measured barrier thicknesses rather than their nominal values. For instance in Figure 2a, at the 5-1/8 DBG

\*The Gap Decibang is the shock intensity unit, X, which is related to the barrier thickness, GT, (in mils), by  $X = 30 - 10 \log GT$ .

\*\*PMMA, polymethylmethacrylate, is a generic name.

level (which corresponds to a thickness of 307.3 mils) we used barriers measuring 306.1 mils minimum to 307.9 mils maximum, whose corresponding shock intensity values range between 5.141 to 5.116 DBg. The nine individual values were the ones used in the maximum likelihood analysis rather than the single 5.125 value, nine times. There is another advantage to this procedure. The Bruceton analysis requires that the data be acquired in a very specific stair-step pattern. Shot 21 and 22 in Figure 2a, and Shots 3, 4, and 5 in Figure 2b, could not have been used in a Bruceton analysis but are valid data for the maximum likelihood analysis. Thus no shots were wasted -- a valuable attribute in these times of tight money.

2.7 In passing, we point out that the stair-step method of collecting data is still highly preferred because it masses the data around the 50% response point. While it is true that the maximum-likelihood method takes into account data which may be far away from the 50% point, such data have little relative weight and cannot, therefore, be used efficiently.

2.8 SSGT OUTPUT DETERMINATION BY STEEL DENT MEASUREMENT. It had been hoped that by making the SSGT acceptor explosive column long (its length is 7 1/2 diameters) that the explosive would be decoupled from the initiating shock. This would have made possible a measure of the characteristic explosive vigor of the acceptor explosive for each Go observed. For some explosives this hope was nearly realized. For others this is far from true.

2.9 Figure 3 illustrates the marked difference in this report between two explosives: DIPAM and RDX. DIPAM gives a clear cut differentiation in output between a Go and a No-Go. The output is very nearly at the maximum or else it is virtually nil. On the other hand the output of PDX near the 50% response point shows a gradation of responses from a few mils dent to relatively large values which are, however, less than would be observed if the acceptor column were initiated with no attenuation between the donor and the acceptor. Other work, not covered in this report shows that as the shock strength is increased above that for the 50% response level, the output asymptotically increases to the zero gap value.

2.10 THE CRITERION OF FIRE. At the inception of the SSGT (as described in reference 1) it was decided to set the criterion for a Fire (or Go) as being one half of the zero-gap dent output\* of the acceptor. Therefore two of the acceptors were first fired with no barrier and the Go/No-Go criterion was set at 1/2 of the average of the dents from these shots. More recently it has been decided that two measurements of the zero-gap output were really too few. The procedure now used is exemplified in Figure 2. Twenty-five pieces are loaded. They are assigned to the test in random order.

\*A firing at zero-gap (no PMMA barrier between the donor and acceptor) has been dubbed by our ordnancemen as a "barefoot shot" or "barefoot dent".

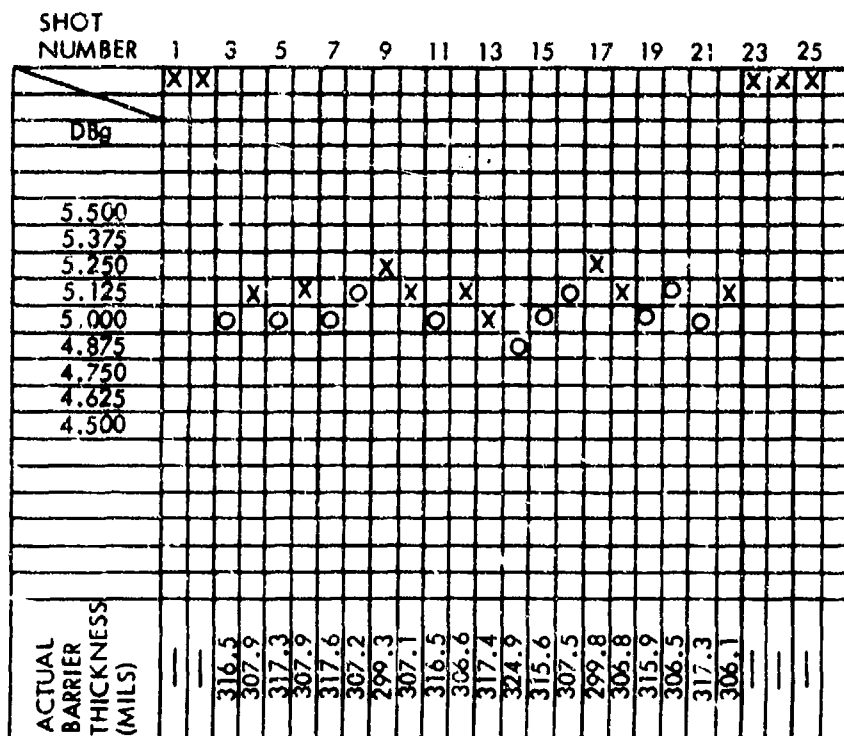


FIG. 2a  
RDX/STEARIC ACID  
(96.7/3.3)  
@ 16KPSI

| BRUCETON ANALYSIS | MAXIMUM LIKELIHOOD ANALYSIS |
|-------------------|-----------------------------|
| $\bar{X}=5.090$   | $\bar{X}=5.091$             |
| $s=0.1981$        | $g=0.0496$                  |
| $s_m=0.063$       | $s_m=0.029$                 |
| $n=19$            | $n=20$                      |

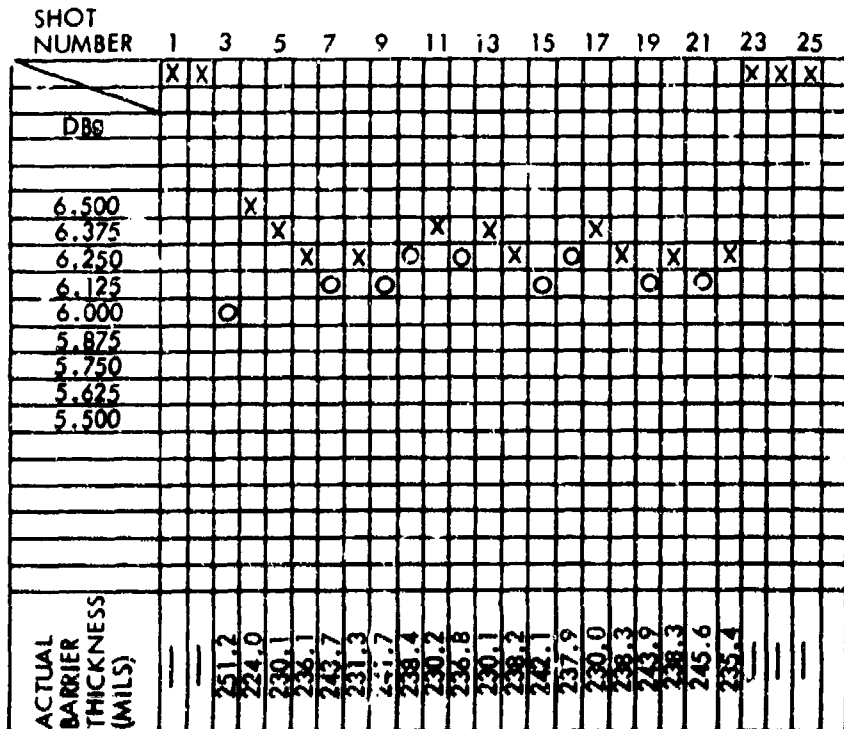


FIG. 2b  
RDX/STEARIC ACID  
(96.7/3.3)  
@ 32KPSI

| BRUCETON ANALYSIS | MAXIMUM LIKELIHOOD ANALYSIS |
|-------------------|-----------------------------|
| $\bar{X}=6.234$   | $\bar{X}=6.228$             |
| $s=0.0443$        | $g=0.0212$                  |
| $s_m=0.0193$      | $s_m=0.0158$                |
| $n=17$            | $n=20$                      |

FIG. 2 TYPICAL DATA RECORDS, COMPARING THE BRUCETON WITH THE MAXIMUM LIKELIHOOD LOGIT ANALYSIS

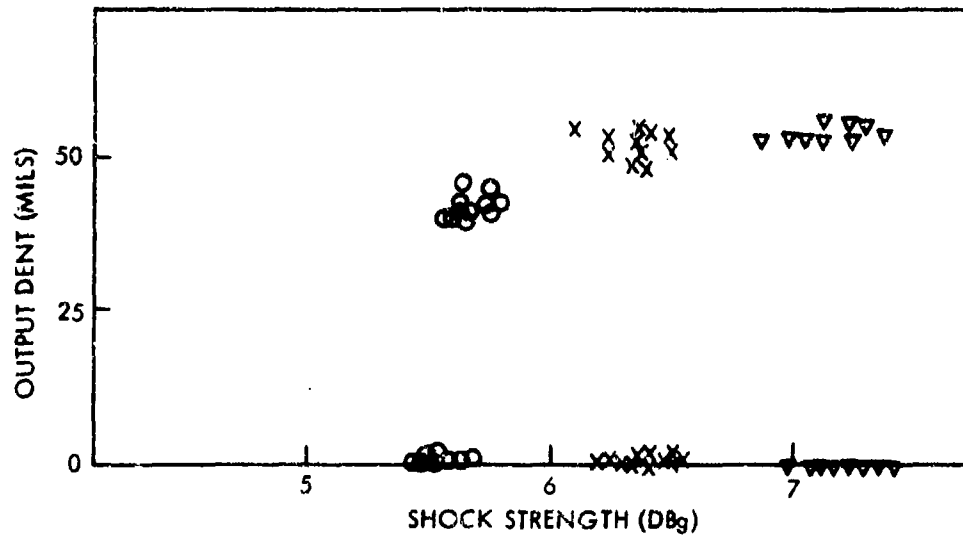


FIG. 3a  
DIPAM

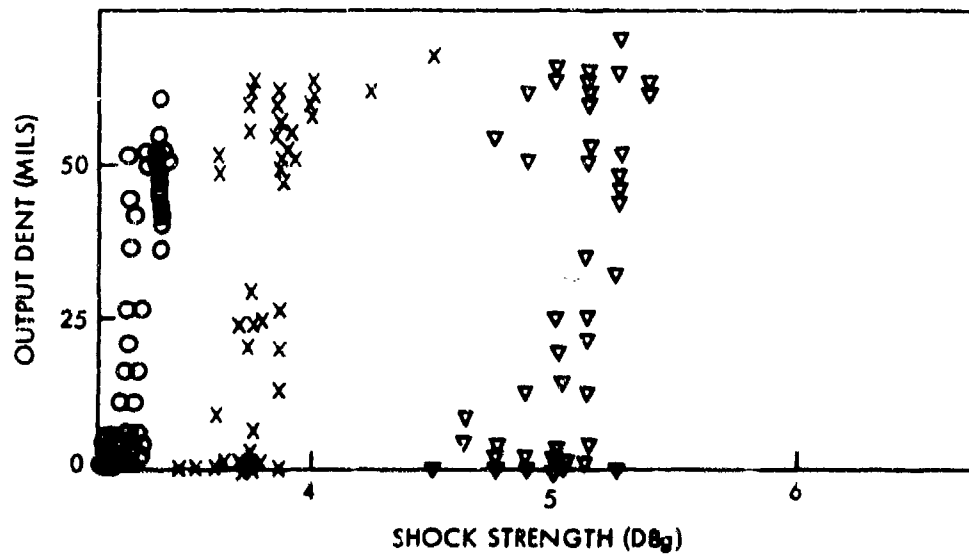


FIG. 3b  
RDX

○ LOADED AT 8 KPSI  
x LOADED AT 32 KPSI  
▽ LOADED AT 64 KPSI

FIG. 3 EFFECT OF SHOCK STRENGTH FROM DONOR ON ACCEPTOR  
OUTPUT (SSGT CONFIGURATION)

The first two are fired barefoot, thus giving us a provisional value for the criterion-of-fire. We then fire the next 20 pieces in a Bruceton stair-step firing plan. The remaining three pieces have been held as a reserve against any misfortune during the 20-shot run. If the contingency does not arise, then the remaining three shots are also fired barefoot. The description of the data reduction is given in the next paragraph.

**2.11 DATA REDUCTION, GENERAL DESCRIPTION.** A computer program is used to reduce the data by the maximum likelihood method referred to in paragraphs 2.5 and 2.6 above. The output dent readings are paired with the individual barrier thicknesses which had been measured with a micrometer. The barefoot shots (being identified by the fact that the barrier thickness is zero) are first used to compute the criterion by averaging the dents and then dividing by two. The computer then tests each shot for fire or fail on the basis of the dent for that shot. Also the barrier thickness is converted to the corresponding DBg value. With this information the program can then compute the sensitivity parameters.

**2.12 DENT BLOCK/HARDNESS CORRECTION.** From the outset of the SSGT it has been obvious that the magnitude of the dent in steel by a donor (or acceptor) will be influenced by the strength of the steel -- the stronger the steel the less the dent produced by a standard explosive charge such as the donor. One of the measures of steel strength is the indentation produced by a hardness test such as the Brinell, Rockwell, Knoop, or DPH (Diamond-Pyramid Hardness). Our original work was done with the Rockwell B scale, but its range is too limited. The DPH scale, on the other hand covers a broad range of steel hardnesses. Figure 4 has been prepared to show how the Rockwell B and C scales relate to the DPH values. Also, on this curve, we have placed an arrow labeled 1018-1020 which shows the nominal hardness for the dent blocks called out for the SSGT.

**2.13** In the early 1960's a large number of donors was fired against blocks ranging in hardness from Rockwell B-60 to B-96. An empirical correction equation was developed from the data over this limited hardness range. A simple straight line fit was made between the Rockwell B hardness reading and the observed dent. No attempt was made to tie in the equation with theoretical relationships involving strength of steel. The correction equation is

$$\delta_c = \delta_o + \frac{2}{3} (H - 83),$$

where  $\delta_c$  and  $\delta_o$  are the corrected and observed dents, and H is the hardness in Rockwell B units. More recently blocks of various hardnesses, including ELASTUFF 44 -- a high-strength pre-hardened tool steel -- were fired with recently-made explosive donors. In Figure 5 the observed dents for these shots plus a smooth line plot of the correction equation show that the recently observed firings fall very

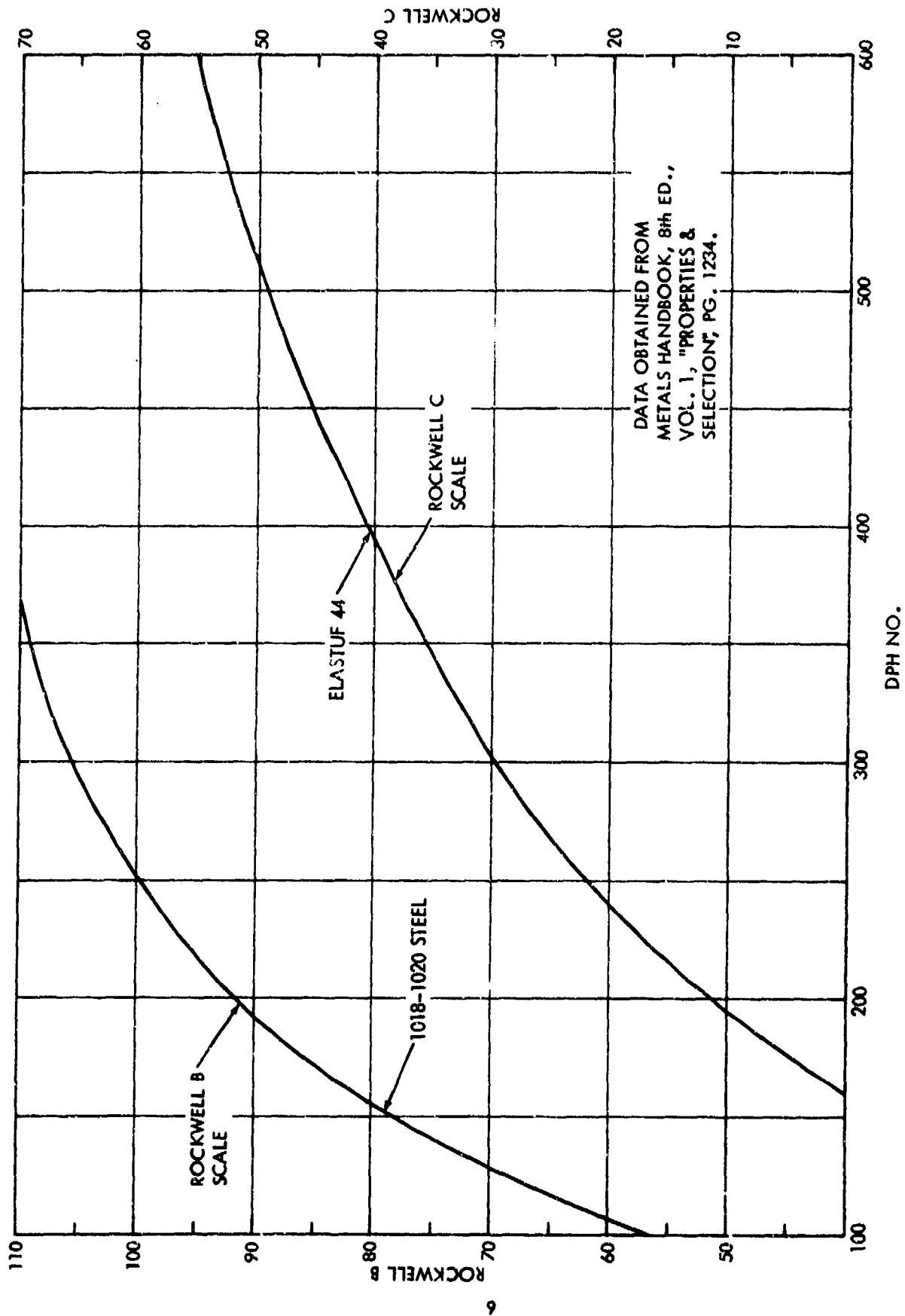


FIG. 4 INTERCONVERSIONS BETWEEN DPH NUMBER (DIAMOND PYRAMID HARDNESS) AND ROCKWELL HARDNESS.

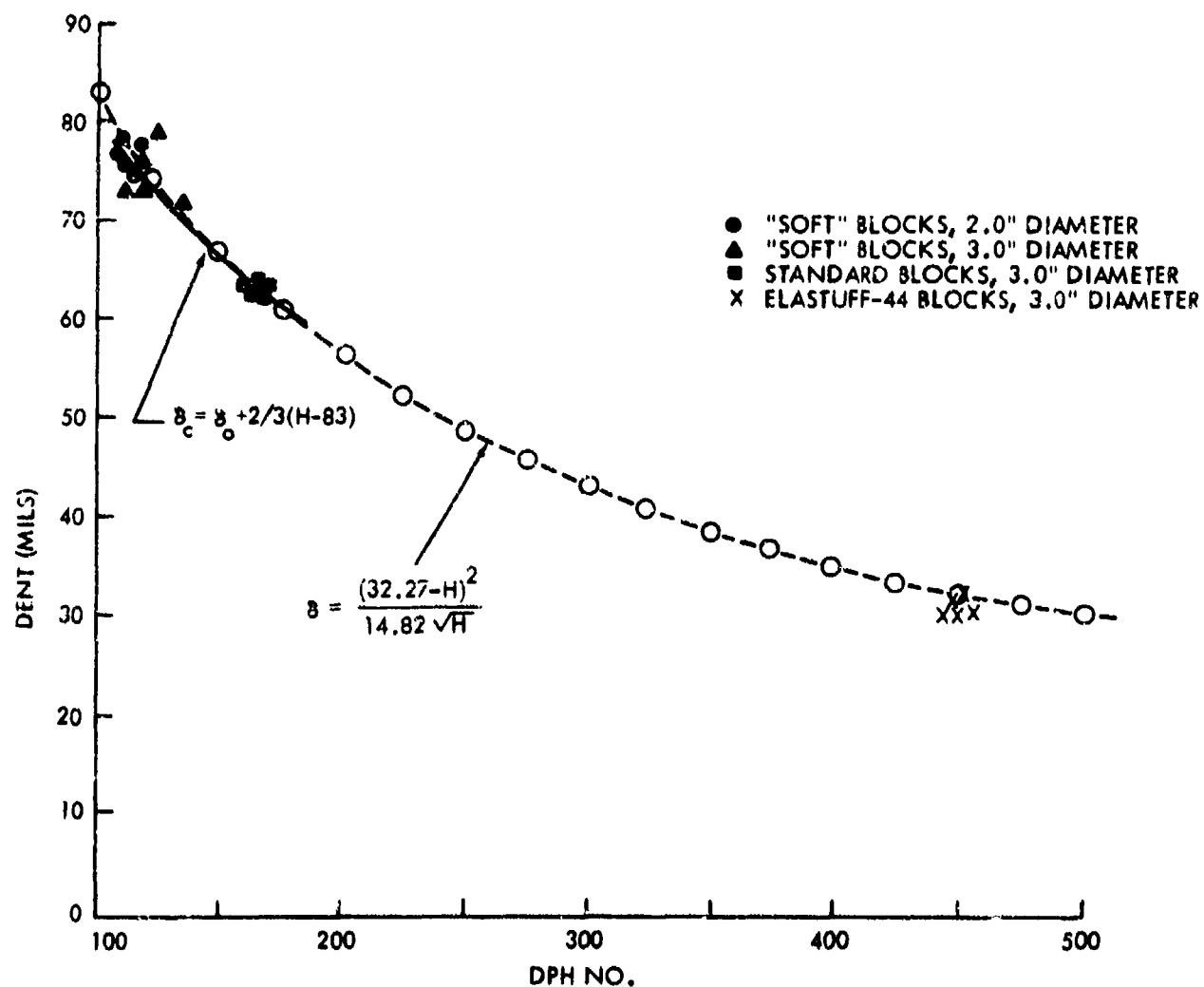


FIG. 5 DENT VS HARDNESS, COMPARISON OF RECENT DATA WITH ORIGINAL EMPIRICAL CORRECTION EQUATION



nicely on the previously established curve. It should be noted that the smooth-line plot of the empirical correction equation is no longer a straight line. This is because the conversion between the Rockwell B scale and the DPH No. is non-linear. Also on Figure 5 is a curve which extends from the "softest" to the "hardest" blocks. This latter curve is a first try at relating the impulsive pressure causing the dent and the dynamic elastic limit of the witness block to the pressure pulse generated by the explosive charge. While some of the terms of the equation are empirical, there are terms which permit manipulation of the curve to take into account different charge output strengths and different block materials. It should also be noted that, while the two curves do not superimpose, their differences are not significant over the hardness range over which the original equation was applied.

2.14 Although the initial contention is justified that the dent will be affected by block hardness, it has not been clearly demonstrated that application of the dent correction reduces data scatter or increases precision over a limited range of block hardnesses. It ought to improve matters and its use usually can be justified on that basis, but the reason that the improvement generally is not readily detectable is that there are so many other variabilities inherent in the test. An in-depth study of such variabilities has been made by Montesill and another aspect of the problem is discussed in paragraph 4.5 of this report.

#### 2.15 PROCESSING OF SSGT DATA.

NOTE: All data obtained in the SSGT configuration have been computed using the dent correction equation quoted above.

It is assumed that the use of the observed dent rather than corrected dent will in most cases make no difference in the sensitivity data quoted in this report; in the remainder of cases the differences should be minimal. But this, it is hoped, will be the subject of future study and should be rather easy to accomplish since much of the necessary data are already in key-punched form and can be very simply reprocessed.

2.16 PROCESSING OF SSGT(A) DATA. At this date (1973) it is not possible to state whether SSGT(A) data will be processed using observed dent or corrected dent data for the acceptors; therefore it will be, of necessity, our practice to indicate which method has been used. The choice, which at present cannot be made simply, is governed by two competing factors:

- a. dent is affected by block hardness -- a fact which should not be ignored; and
- b. economy -- the use of observed dent will be less expensive since the taking of hardness measurements, and the attendant processing of numeric data can be eliminated.

### 3. DATA PRESENTATION

3.1 The primary objective of this report is to make a large body of data available, and at the same time intelligible and usable. Data, in pack form, for the various explosives are presented in Appendices B, C, D, E, F, and G where the explosives are grouped in general categories. Indexes for specific data are contained in Appendix A. The scheme for organizing and paginating a data pack is given in Table 1b, Table 1a being a list of the explosive categories.

3.2 PAGINATION SCHEME. Since many, if not most, of the data packs will be incomplete, the pagination scheme has been contrived to allow expansion by insertion. From Table 1b it can be seen that each page from a data pack will have a pagination code of four elements:

- a. An upper-case letter designates which of the six appendices it belongs in.
- b. An arabic numeral indicates the explosive to which the information pertains. An index of explosives by these numbers is given in Appendix A-2. Cross referencing by explosive name to find a specific explosive-appendix-and-number is to be found in Appendix A-1.
- c. A lower case letter, in the third position, indicates the batch, lot, or sample of explosive to which the data of a data pack apply. Each time data for a new batch or new lot or sample of explosive is available, a new letter is assigned. The first three units of the designation, e.g., C2d, serve as a unique identification of a data pack. Appendix A-3 is an index of all explosive data packs.
- d. An arabic numeral, in the fourth position, designates the specific type of information on that page. There will always be a page 1 but page 2 (the reverse side of page 1) will often be virtually blank either because there is insufficient unique information to be presented or because time and funding do not permit its inclusion. Any higher number pages, should there be no corresponding information prepared, will simply be omitted.

A complete data pack is illustrated in Figure 6. The group, pages D1c1 through D1c6, is an example of a fairly complete data pack.

Table 1a. CATEGORY ASSIGNMENTS

| APPENDIX | EXPLOSIVE CATEGORY             |
|----------|--------------------------------|
| B        | Initiator                      |
| C        | Booster/Warhead                |
| D        | Thermally Stable               |
| E        | Plastic Bonded                 |
| F        | Miscellaneous<br>Secondaries   |
| G        | Variable Composition<br>Series |

Table 1b. EXPLANATION OF PAGINATION CODE FOR APPENDICES  
B THROUGH G

Appendix Location, As Above

Explosive Number, (Note 1)

Batch, Lot, X No., Z No., or other grouping (Note 2)

Data-Type Designator:

B.1.a.1 Basic Data, and DBg vs Loading Pressure Plot

B.1.a.2 Chemical Data

B.1.a.3 DBg vs Density Plot and Density vs Pressure Plot

B.1.a.4 Output vs Loading Pressure Plot

B.1.a.5 Dent vs DBg Plots

B.1.a.6 Dent vs DBg Plots

B.1.a.7 Dent vs DBg Plots

etc.

Note 1 Explosive numbers are indexed in Appendix A-2

Note 2 For explanation of X and Z numbers see paragraph 3.10

TABLE 1. EXPLANATION OF ORGANIZATION AND  
PAGINATION OF APPENDICES B,C,D,E,F, AND G.

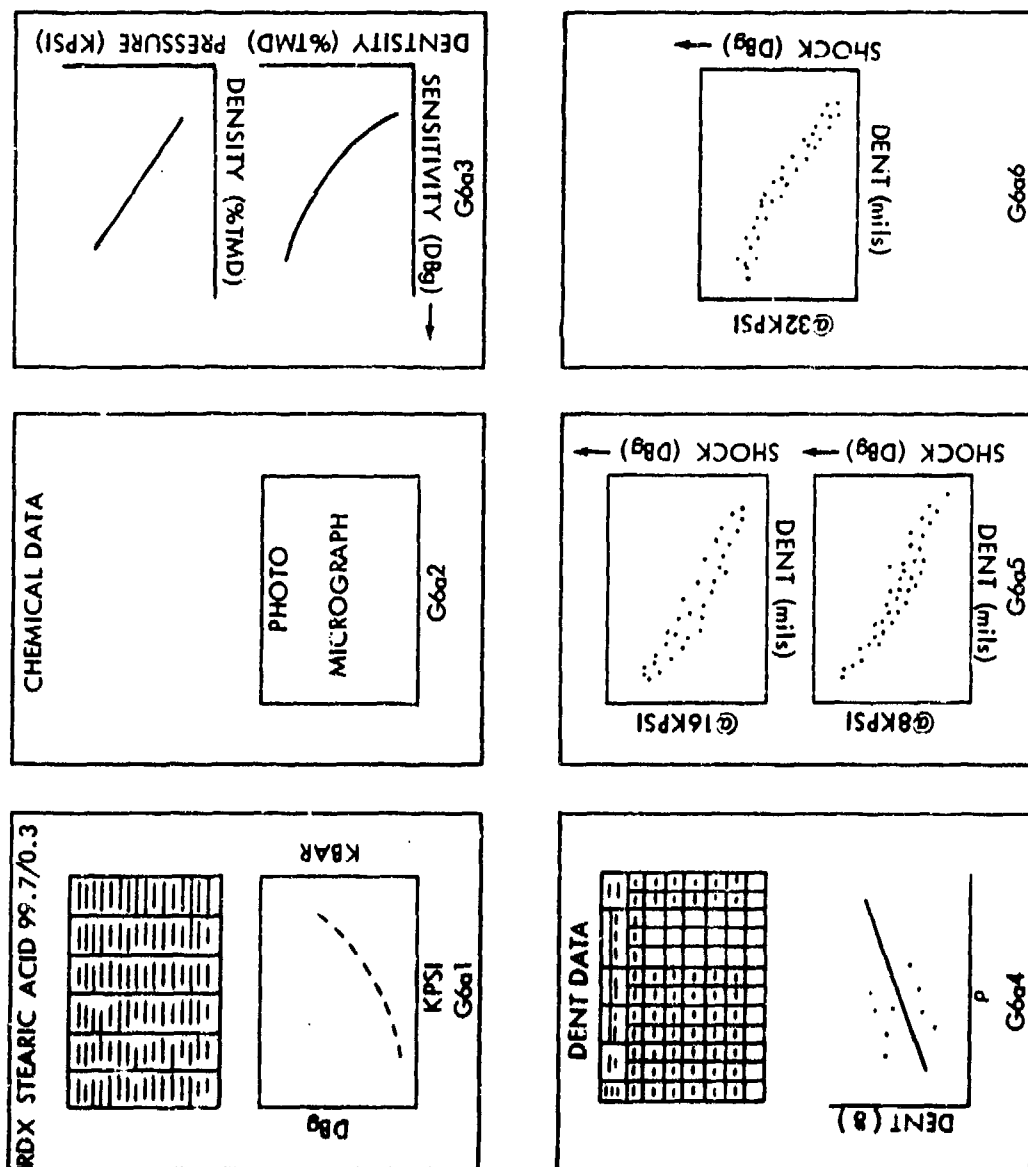


FIG. 6 THE ELEMENTS OF A COMPLETE DATA PACK

3.3 MODES OF EXPANSION. This open-ended format permits expansion in a number of different ways. Should information on a new explosive become available, it will be inserted after the last entry in the most appropriate appendix. It will be given the next sequential number (sub-paragraph b of the preceding paragraph). Indices A-1, A-2, and A-3 would all have to be revised. Should the new information be the addition of another batch of explosive of a kind already included in the collection, the data pack would be given the next sequential letter (sub-paragraph c of the preceding paragraph) and index A-3 revised. And finally, should it be an augmentation of a particular data pack, then page replacement and/or addition would be involved.

3.4 It is our intent to put a "print-date" on each page of information. The "print-date" may or may not be a publication date. It certainly will not be the date when the experiments were performed or when the data were processed. But it will become useful in later times to determine, by checking with the current listing in Appendix A-3, whether the latest page revisions are properly at hand.

3.5 DETAILS OF TYPE 1 DATA PAGE (BASIC DATA, AND DBg VS KPSI PLOT). While many of the features of this data page are self-evident, there are others which merit explanation. Figure 7 is a picture of a typical data page with symbols keyed to specific points which will be described in detail below. The data on this page are presented as being the closest to the measured parameters without going to the original data sheets. The independent variable is the loading pressure, expressed in thousands of pounds per square inch (KPSI). The dependent variables are the observed charge density, and the sensitivity. The loading pressure (1) is given in the first column of the tabulated data. The average (2) and the estimate of the standard deviation (3) of density are expressed in grams per cubic centimeter. The density is also shown (4) as percent of Theoretical Maximum Density\* (TMD). The sensitivity (5) is expressed in units of the Gap Decibang (DBg). The computation of sensitivity parameters has been discussed in paragraphs 2.5 through 2.8, 2.11, 2.15 and 2.16.

3.6 The sensitivity parameters given are:

- (6) AVG; the predicted 50% response level,
- (7) g; the estimate of gamma, the logistic variability parameter,
- (8)  $s_m$ ; the estimate of the standard deviation of the 50% response level, and
- (9) N; the number of data points contributing to the sensitivity estimate.

\*The value of the TMD (10) is often subject to small errors of various kinds: difficulty of obtaining pure voidless samples, entrapment of solvent or "mother liquor", inaccuracies of analysis of mixtures, and unavoidable admixtures, e.g., HMX, up to eight percent, always to be found in Class B RDX.

10

5

11

12

13

1

EXPLOSIVE

TMD

X NO.

I.D. NO.

DATE OF TEST

2

3

4

LOADING PRESSURE (KPSI)

DENSITY (GM/CM<sup>3</sup>)

AVG.

S

% TMD

SENSITIVITY (DBG)

AVG.

g

sm

N

REMARKS

14

6

7

8

9

16

17

18

4

8

16

32

64

50% FIRING STIMULUS (DBG)

50% FIRING STIMULUS (KBAR)

3

5

10

20

30

40

50

60

70

80

90

100

LOADING PRESSURE (KPSI)

SMALL SCALE TEST (SSGT) DATA

81e1

PRINT DATE

15

FIG. 7 REPRESENTATION OF AN INITIAL PAGE OF ANY DATA PACK

In some few instances it will be noted that the heading of the variability column (7) will be "s" not "g". This signifies that the sensitivity computations were done with a Bruceton Analysis, and that the Normal (Gaussian) distribution was taken as the descriptive distribution function. In such cases "s" is the estimate of  $\sigma$ , the standard deviation.

**3.7 EXPLANATION OF APPENDIX H.** Tables H1 through H5 have been included as ancillary information. Table H1 aids in making quick estimates of high or low functioning probabilities from the variability parameter ("g" or "s") and the 50% point. Table H5 is a detailed table giving probabilities corresponding to the L variate where L is the number of logits in an interval, in the logistic probability space.

**3.8** As a convenience for those who wish to think or convert from DBg units to physical thickness dimensions of the barrier the Tables H2, H3, and H4 have been provided. These are similar to logarithm tables in layout; the DBg is entered along the left edge and top and the corresponding barrier thickness is to be found in the body of the table. Table H4 covers the range of -4.9 to +14.9, in 0.1 DBg steps. Tables H2 and H3 cover from 1.00 to 10.99, in 0.01 DBg steps and can be interpolated for the next significant figure. Finally, it is pointed out the Tables H2, H3, and H4 aid in translating data back to the original controlled experimental parameter -- barrier thickness.

**3.9 ADMONITORY NOTE.** We point out that statistical computations using the 50% point and "g" or "s" are valid only when they are expressed in units of DBG. Translating the parameters into barrier thicknesses, followed by the use of these parameters in firing probability estimates, cannot be a statistically proper procedure.

**3.10 X NUMBERS, ID NUMBERS, Z NUMBERS.** The Naval Ordnance Laboratory has a system for logging in explosives received by the Laboratory. An "X Number" (11) is assigned; and box labelling, procurement information, date, manufacturer's batch or lot number, etc., is recorded where possible. The X-Number system can also be invoked when a batch of explosive is synthesized or so processed within the Laboratory that it can properly be thought of as having taken on a new identity. There are occasions when explosives are used and tested which do not have an X Number. Meanwhile an independent logging system, assigning "Z-Numbers", was in use by the Initiation Research Group whose collective efforts are the basis for the present report. In the early 1960's it became evident that this logging system did not give adequate traceability of materials used by the Group. A computerized continuous-inventory system was developed. As part of this system, all explosives, pyrotechnics, components, trains -- explosives in whatever form -- were assigned an ID Number (12). This applied to all explosives on hand and to all explosives since received by the Initiation Research group. The ID Number can be thought of in much the same way as a library accession number.

3.11 In a number of cases there will be data for the same explosive composition, but different X Numbers [e.g., CH-6: X329, X344, X439, X440, X441, X442, X445]. Each X Number is considered a separate material, in the sense of being a different production or processing lot or batch. From such replicate data we can obtain batch-to-batch variability statistics which permit prediction of future production variability (assuming the production process will be unchanged in the future).

3.12 When we have worked with the same explosive and the same X Number, we still have assigned new I.D. Numbers to portions whenever some chemical or physical operation such as sifting, temperature conditioning, etc., has been done on it. Since "numbers are cheap" we have often assigned a new I.D. as a consequence of minor operations, which probably would not alter the explosive -- but just might. Consequently there are numerous instances where there are data on a particular X-Number of an explosive, but of different I.D. Numbers. The data may or may not be combinable. Care must be exercised. The fact that there are different I.D. Numbers serves as a warning flag.

3.13 STANDARD LOADING AND TESTING CONDITIONS. The "Date of Test" (13) entry must be recognized as an approximate indicator of time. The time span, from the writing of the "load" order to the final shot of a Small Scale Gap Test, is rarely less than two weeks and sometimes can take a few months. The "Remarks" (14) column will signal special considerations.

Ordinarily, explosives are pressed into the SSGT test bodies and fired at: Temperature =  $75 \pm 3^\circ\text{F}$ ; Relative Humidity =  $47 \pm 2\%$ ; and at the ambient pressure of 350 feet above sea level.

Deviations from this, such as vacuum loading, firing at high or low temperatures, etc., will either be indicated in the title block or more likely in the Remarks column. Elevated temperature firing was done at first by wrapping the SSGT acceptor body with insulated Nichrome wire to be used as an individual disposable heating unit. The temperature was followed by means of a thermocouple inserted into a hole drilled in the SSGT body. A better method, which can be used for firing at temperatures either hotter or colder than ambient was developed by Kilmer, of this Laboratory and is described below and shown in Figure 8. (See also NOLTR 67-133.)

3.14 SSGT FIRING AT NON-AMBIENT TEMPERATURES. A method was needed for firing SSGT acceptors at temperatures far from ambient temperatures. But it was desirable not to change the temperature of the witness block or the donor. The acceptor is conditioned in a separate chamber. The donor-and-detonator assembly, with the attenuator attached to the



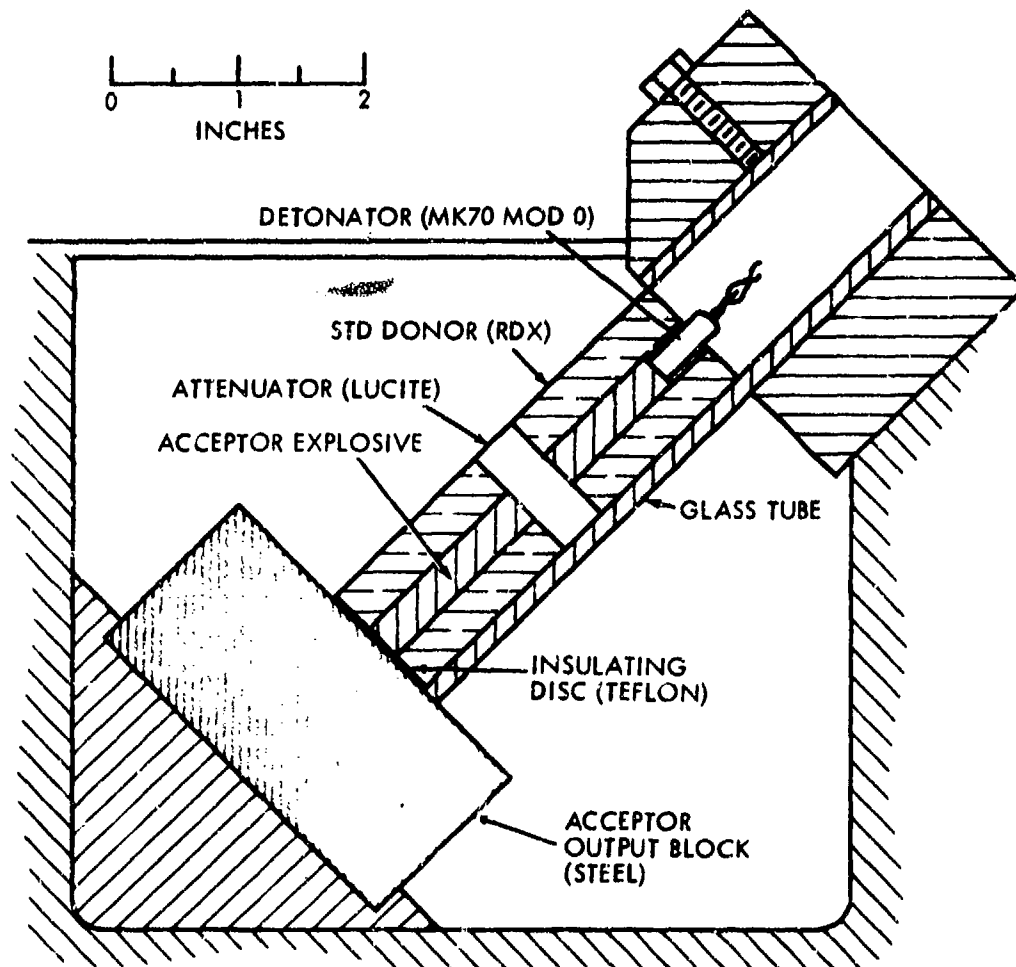


FIG. 8 EXPERIMENTAL ARRANGEMENT FOR THE DETERMINATION OF THE SENSITIVITY OF EXPLOSIVES AT VARIOUS TEMPERATURES

bottom end of the donor is held in the upper end of the slotted glass tube. A 20-mil thick Teflon disc rests on the steel block and serves to give thermal isolation of the bottom end of the acceptor.. Modification of the output reading by the Teflon disc is barely detectable. The conditioned acceptor is taken quickly from the conditioning box and slipped into place. The detonator-donor-attenuator is dropped into place and fired. If the firing is done within 30 seconds of removal of the acceptor from the conditioning chamber, the acceptor will have changed no more than 10 or 15 degrees from the "soak" temperature.

3.15 PLOT OF DBg VS KPSI. This data plot, placed at the bottom of the first page of each data pack, is provided to aid visualization of the data in a mode close to the observed experimental parameters. The loading pressure (15), (16) which is the independent variable (expressed in KPSI) is arranged in a logarithmic scale. The tick marks 16 at 4, 8, 16, 32, and 64 KPSI are included simply because this is the usual, although not immutable, choice of loading pressures. The dependent variable, sensitivity or 50% response point, (17) is plotted in units of DBg. As a conceptual aid in shock hydrodynamic terms, a scale is appended along the right edge (18) which shows the peak shock pressure expressed in kilobars. It must be remembered, however that this is a derived scale based on physical measurements and calibrations<sup>12</sup> which even now (1973) are subject to refinements.

3.16 PLOTS OF DBg VS  $\rho$  AND  $\rho$  VS KPSI. The third page (if any) of a data pack will contain two more data plots. The first of these -- sensitivity (in DBg) vs charge density -- depicts a relationship which is more fundamental than sensitivity vs consolidating pressure. On the other hand a parametric relation of practical interest in the manufacturing of explosive components is the charge density as a function of consolidating pressure (colloquially referred to as the "squash modulus"). As was pointed out in reference 11, the density usually turns out to be linear with the logarithm of the loading pressure. This fact underlies the choice of semilogarithmic coordinates for the three plots described in this paragraph and the preceding one.

3.17 PLOT OF "BAREFOOT DENT" VS KPSI. The fourth page (if any) of a data pack will display the acceptor output vs the consolidating pressure. A typical plot of this type of information occurs on Data Page D1c4.

3.18 PLOTS OF DENT OUTPUT VS DBg. A presentation of all of the Dent Output Data obtained during a Small Scale Gap Test (such as in Figure 2) gives a valuable insight as to the build-up to detonation of the explosive under these particular conditions. Examples of these graphs are given for HNS-R (See Data Package D6a, page D6a4

and D6a5) and for the RDX/Stearic Acid Series (see the pages 4 and 5 of each of the Data Packages G6a to G6f, inclusive). Those explosives which do not show a clear-cut output response, but which give a spectrum of outputs when initiated at the 50% point or even with stronger inputs should be used cautiously in small-scale systems. It is pointed out that the SSGT acceptor is highly confined (in a 0.4-inch-thick brass wall) and is very long (7-1/2 column diameters in length). A practical explosive component will usually be shorter and probably smaller in diameter, compared to the SSGT configuration, and will be less highly confined; a practical explosive component loaded with an explosive which shows gradual build-up properties may be more variable in its output and also may have its output more strongly affected by any variation of the input vigor.

3.19 A REASON TO WORRY. The significance of all this, in the eyes of the designer of explosive trains, is that he must make sure that an explosive component using such a material must be so strongly initiated that it gives a uniform output. If this constraint on the design is not satisfied there is all too much likelihood that a small variation or degradation of the quality of the initiating component will cause a major degradation or outright failure of the component loaded with the explosive in question.

#### 4. PRELIMINARY VALIDATION OF SSGT(A)

4.1 The original intent of the designers of the SSGT test was to develop a carefully controlled laboratory test which would have stability of performance over the years in spite of inevitable changes in manpower and materials. It was an outright assault on Murphy's Law.\* But it can be seen by careful study of the data -- replicates, batch similarities, etc., -- that the test does give good repeatability.

4.2 COST OF SSGT & SSGT(A). The cost of running the SSGT was originally priced at about 11 dollars per shot. With 20 shots, each at five different densities, it took about \$1100 to make one complete characterization of sensitivity, output, and compressibility. This price was somewhat unrealistically low since the detonators had been drawn from stock as preexpended material. In 1973, inert materials, labor, overhead, and the detonators have raised the price per shot to about \$30. At 25 shots at each of five levels the cost of a characterization is now \$3750. Savings, however are possible. Going from SSGT to SSGT(A) (that is, going from a \$5 to a 60¢ detonator) will help. The NIF funding system, which tends to force us to buy small-quantity amounts -- only as much as is needed for the particular job -- makes piece-part costs much higher than would be the case for volume production. But we are looking into procedures for volume purchases, as a supply function, with costs to be reimbursed by user projects.

At this point we recount as warning that the one item that has caused the most grief in the SSGT is procurement of the brass gap-test bodies. The design and the drawing are deceptively simple. Time and again we have had cost over-runs, high spoilage, and much unacceptable material. Apparently, because the piece looks simple to make, the tendency is to put apprentice machinists on the job with inadequate supervision. The troubles have been varied and manifold:

\*"If anything can go wrong, it will; and if a number of factors can go awry, that factor which will harm the project the most will be the first to do it." etc., etc.

Scratches, grooves, spirals in the holes;  
Hour-glass, or barrel-shaped, or bent holes;  
Holes too large;  
Straight holes but not perpendicular to the ends;  
Burrs;  
End-flatness requirements not met.

4.3 A STUDY OF DONOR OUTPUT. One of the many procedures adopted at the outset to assure continued quality of the SSGT was to specify the steel dent output of the donors. Actually there was a suspicion of over-specification. There were strong opinions that (1) if the donor explosive (RDX Type B Class B) quantity, density, and column length, were held to better than 1% accuracy, (2) if the EED were a quality detonator with control of output, (3) and if the donor body were heavy walled and precisely made, then the output just had to be uniform. We measured the output anyhow, on 5 to 10% of each batch of donors that was made. Table 2 shows data obtained throughout the decade that this test has been run. It is by no means an exhaustive compilation. There have been at least 50 and sometimes as many as 100 shots in each of the 11 groups. Groups a, b, c and d were obtained in the first year and a half or two years (1959, 1960). Group e was loaded about 1965 and the remaining groups at various times up to the writing of the present report (1971-1972). On the basis of the first four groups of data a tentative set of specification limits was established for steel dent output of the donor (in mils) at  $D_{min} = 62.5$ , to  $D_{max} = 65.0$ ; and  $s_{max} = 2.0$ .

4.4 It became apparent that we were at times unable to meet our own specification limits on a newly loaded group of donors. When such an occasion arose some previously fired, (and therefore calibrated) explosive was loaded as an acceptor and fired in the SSGT. The results indicating no significant shift in the SSGT system, we accepted the batch of donors as being all right, making a mental note that the output specification on the donors was probably unrealistically restrictive. If block hardness variation can be expected to add to the error of output measurements, then correcting for hardness ought to reduce measurement error. This should show up as a reduction of, 2, the estimate of the standard deviation. Referring to the appropriate data for groups e through k of Table 2 it can be seen that, if anything, the opposite is true. The donor output problem became even more severe when the SSGT configuration was incorporated into the specifications for DIPAM and HNS. Manufacturers and other explosives laboratories were also on occasion having trouble meeting the donor output requirements. It has by now become evident that the requirements are unrealistic and that something has to be done.

4.5 CHANGING THE DETONATOR. For reasons of economy, and at the same time to permit the use of an EED which is relatively insensitive,

Table 2  
A SELECTION OF STEEL DENT OUTPUT DATA  
FOR SSGT DONORS

| Group | Load<br>Order | Steel Dent Output (MILS) |      |           |      |
|-------|---------------|--------------------------|------|-----------|------|
|       |               | Observed                 |      | Corrected |      |
|       |               | B                        | s    | B         | s    |
| a     | -             | 62.4                     | 2.25 | -         | -    |
| b     | -             | 63.4                     | 2.03 | -         | -    |
| c     | -             | 63.0                     | 1.76 | -         | -    |
| d     | -             | 64.4                     | 1.79 | -         | -    |
| e     | 1078          | 67.6                     | 4.80 | 69.6      | 5.74 |
| f     | 1118          | 64.9                     | 2.43 | 67.0      | 4.43 |
| g     | 1150          | 67.3                     | 4.75 | 69.5      | 3.84 |
| h     | 1167          | 66.1                     | 1.20 | 68.5      | 1.47 |
| i     | 1258          | 64.1                     | 1.72 | 64.1      | 1.99 |
| j     | 1284          | 63.1                     | 3.04 | 65.4      | 2.96 |
| k     | 1375          | 65.9                     | 2.85 | 64.9      | 2.93 |

both in the normal through-the-bridge firing mode and the lead(s)-to-case mode,\* it was decided to replace the Mk 70 Detonator with an insensitive commercial blasting cap (E-1A(6) Detonator). From Figure 1 it can be seen that the Mk 70 Detonator slips into a recess in the top of the donor. But since blasting caps (of the type we wished to use) are bigger in diameter than the 0.72005 diameter hole of the donor, we judged that it would not be desirable to initiate the donor over a gap. Therefore we decided to load the donor flush, to 0.72005 shallow, at the detonator (fill) end.

4.6 Arbitrarily the blasting cap we have chosen to use is the E-1A(6) DuPont Electric Detonator.\*\* Table 3 shows two studies run a few years apart measuring the steel dent output of flush-loaded SSGT donors fired by the E-1A(6) as compared with the standard recess-loaded donors fired by a Mk 70 Detonator. There really is no difference demonstrated between the SSGT and SSGT(A) donors. But there is another, and rather sensitive test method available which has come as a spin-off of the Teteryl Substitutes Program currently underway at NOL. Part of the work is a finalizing of the SSGT type of sensitivity test called out in OD4481113. This version of the SSGT(A) establishes a specific shock strength (by appropriate barrier choice) so that the explosive under test (loaded in the acceptor) shall not yield an observed steel dent output any greater than 2.0 mils in twenty trials. If the explosive is just a shade more sensitive than it ought to be, then it will at least begin to give a more vigorous dent, though not necessarily a full scale output, when tested at the critical level.

4.7 We wished to obtain a comparison of the shock strengths (the output) of the two donors -- SSGT and SSGT(A) by a test more directly relevant to the Small Scale Gap Test than the above dent block experiment. Table 4 shows the results of an experimental comparison of the two donor strengths using the response of SSGT acceptors, loaded with yellow teteryl at 10 KPSI, to detect possible donor shock output differences. Four arrangements were used:

\*Under laboratory conditions, with properly trained personnel, and with the proper operating procedures we consider the Mk 70 Detonator as an adequately safe component of the SSGT. We often point out that it is more hazardous to ride the Washington Beltway, and public highways to get to work, than it is to work as directed, with the SSGT. And in the hands of an incompetent, a blasting cap may not be all that much safer than a Mk 70 Detonator.

\*\*Undoubtedly any number of blasting caps would have been usable in this application. This work can in no way be taken as denigrating of any other designs or any other manufacturer's product. We specify the E-1A(6) DuPont Electric Detonator because "We had them on hand" and could expect to get them whenever needed.

Table 3

COMPARISON OF SSGT AND SSGT(A) DONORS  
BY STEEL DENT OUTPUT READINGS

| Detonator | No. of<br>Shots | Dent Mils       |          |                  |          | Donor |
|-----------|-----------------|-----------------|----------|------------------|----------|-------|
|           |                 | <u>Observed</u> |          | <u>Corrected</u> |          | Load  |
|           |                 | <u>D</u>        | <u>s</u> | <u>D</u>         | <u>s</u> | Order |
| Mk 70     | 20              | 66.3            | 3.48     | 67.7             | 3.83     | 1159  |
| E-1A(6)   | 20              | 65.3            | 3.34     | 68.0             | 3.55     | 1159  |
| Mk 70     | 25              | 64.8            | 2.28     | 64.3             | 2.20     | 1375  |
| E-1A(6)   | 25              | 66.0            | 2.85     | 65.0             | 2.93     | 1375  |

- A. SSGT Donor attenuated with a 446.7 mil barrier,\*
- B. SSGT Donor attenuated with a 421.7 mil barrier,\*\*
- C. SSGT(A) Donor attenuated with a 446.7 mil barrier,\* and
- D. SSGT(A) Donor attenuated with a 421.7 mil barrier.\*\*

There are three possible hypotheses:

1. the SSGT(A) donor is less powerful than the SSGT donor,
2. the SSGT(A) donor is more powerful than the SSGT donor, or
3. there is no demonstrable difference between the two outputs.

From Table 4, Block A we see that when the tetryl is subjected to an input shock of 10.50 kbar\*\*\* (the characteristic output of the SSGT donor attenuated with a 446.7-mil barrier) it gave no dents in excess of 2.0 mils and an average dent of 0.70 mils. From Block B we see that when the shock strength is increased to 11.39 kbar (the donor attenuated with a 421.7 mil barrier) we find that the tetryl responds with dents in excess of 2.0 mils. When initiated by the SSGT(A) donor (whose shock strength is unknown and under scrutiny) the same type of output performance is noted: Block C, no dents in excess of

\*446.7 mil barrier is the one which gives a 3.5 DBg shock with a standard donor.

\*\*421.7 mil barrier is the one which gives a 3.75 DBg shock with a standard donor.

\*\*\*The shock strengths quoted can be found in reference 12.



Table 4

COMPARISON OF SSGT AND SSGT(A) DONORS BY  
 RESPONSE OF YELLOW TETRYL ACCEPTORS LOADED AT  
 10 KPSI AT TWO SHOCK LEVELS

|   |   |   |
|---|---|---|
| ATTENUATOR<br>Rating (DBg)                | 3.50  | 3.75  |
| ATTENUATOR<br>Thickness<br>(mils)         | 446.7   | 421.7   |
| SSGT<br>CONFIGURATION<br>(See Fig. 1A)    | [A]<br>Not any readings of<br>$D > 2.0$<br><hr/> $\bar{D} = 0.70$<br>$s = 0.22$<br>$n = 18$ | [B]<br>$D_1 = 3.75$<br>$D_2 = 3.83$<br><hr/> $\bar{D} = 3.79$<br><br>$n = 2$                          |
| SSGT(A)<br>CONFIGURATION<br>(See Fig. 1B) | [C]<br>Not any readings of<br>$D > 2.0$<br><hr/> $\bar{D} = 0.79$<br>$s = 0.37$<br>$n = 20$ | [D]<br>$D_1 = 2.88$<br>$D_2 = 3.13$<br>$D_3 = 8.1$<br><hr/> $\bar{D} = 4.70$<br>$s = 2.95$<br>$n = 3$ |

Note: all dent values, D, Given in mils

2.0 mils for 20 shots and an average dent of 0.79 mils when a 446.7-mil barrier was used; and Block D, dents in excess of 2.0 mils when a 421.7-mil barrier is used.

4.8 We can make an assumption that the difference between the barriers will make a 0.25 DBg, or 0.89 kbar difference in the shock output of the SSGT(A) donor what ever its absolute value may be. We propose the following logic chain:

1. Block C has been attenuated 0.25 DBg more than the donor of Block B. If the SSGT(A) is more powerful than the SSGT by 0.25 DBg or more than we should expect the dents in Block C (average 0.79) to be greater than the dents in Block B (average 3.79). The dents of the tetryl acceptor are not greater in that manner and therefore the SSGT(A) donor shock strength must be no greater than SSGT + 0.25 DBg.
2. Conversely the donor of Block D has been attenuated 0.25 DBg less than the donor of Block A. But if the SSGT(A) is less powerful than the SSGT by at least 0.25 DBg, then we should expect the dents in Block D to be less than the dents in Block A. Since they are not the SSGT(A) donor shock strength must be no less than the SSGT-0.25 DBg.
3. We conclude that the SSGT(A) donor strength equals the SSGT shock strength to within  $\pm 0.25$  DBg.

4.9 BRASS FOR SSGT BODIES. Originally a large stock of brass was obtained for making SSGT bodies. When it came time to reorder we found that brass according to Federal Specification QQ-D-626 Composition 11 was difficult to obtain. It turns out that Composition 22 is a material which is readily obtainable and, by the nature of the specification, can be considered a sub-set of Composition 11; that is, any brass qualified as Composition 22 is also qualified as Composition 11.

4.10 The SSGT, in varying detail has been described (or called out) in the following documents:

- (1) NAVORD LD 549486B, Explosive Properties Assembly
- (2) NAVWEPS Report 7342
- (3) WS 4660 Purchase Description, DIPAM Explosive
- (4) WS 5003D Purchase Description, HNS Explosive (11 Jan 1967)
- (5) NOLS 1015 Material Specification for Explosive HNS/  
Polytetrafluoroethylene (2 Mar 1973)
- (6) NAVORD OD 44811 "Safety and Performance Tests for  
Qualification of Explosives (1 Jan 1973)

The SSGT(A), described in Revision C of NAVORD LD 54986, is specified in NAVORD OD 44811, which is presently being revised.

## 5. UTILITY OF DATA

5.1 It is beyond the intent of this document to go into a detailed discussion of the data. But there is some information, which has been published elsewhere, that shows some of the ways that we expect that the data will be used.

5.2 The sensitivity of an explosive is controlled by a legion of factors (particle size, density, confinement, etc.,) in addition to the obvious one of molecular make-up. In the practical problem of designing an explosive system that will be adequately safe and sufficiently reliable, the sensitivity of each explosive employed is a controlling design parameter. If we know that a certain explosive tends to have a wide batch-to-batch variability then we know that we must, for instance, design the next preceding element in the train with enough output to be able to initiate the least sensitive batch of the explosive that we expect will ever be used. We are not omniscient. We will not know what the least sensitive explosive will be but we can make some intelligent estimates (draw statistical inferences) if we have data on a number of representative production batches.

5.3 CH-6 STUDIES. Figure 9 is a plot of some early production lots of CH-6. It shows a large lot to lot variability. However there may be a hooker in the data. While certainly these are representative of production batches which were used in weapon development, and likely even in Fleet-fill items, we suspect that the transfer tests (which tested sensitivity and output of CH-6) may have been waived for these materials. If such be the case we cannot know that the material was or was not in complete accord with the specifications. We believe that the information, in addition to being representative of past production, will not be greatly different from current or future production. Besides, this is all that we have to go on.

5.4 DATB STUDIES. Figures 10, 11 and 12 have been derived from data packs D1a, D1b, D1c, D1d, D1e and D1f. Data scatter is due to at least the following factors:

- a. inherent test error
- b. differences between materials (we think D1a, D1b, and D1c are the same but are not sure), and
- c. drift in the SSGT with time (1960 to 1967).

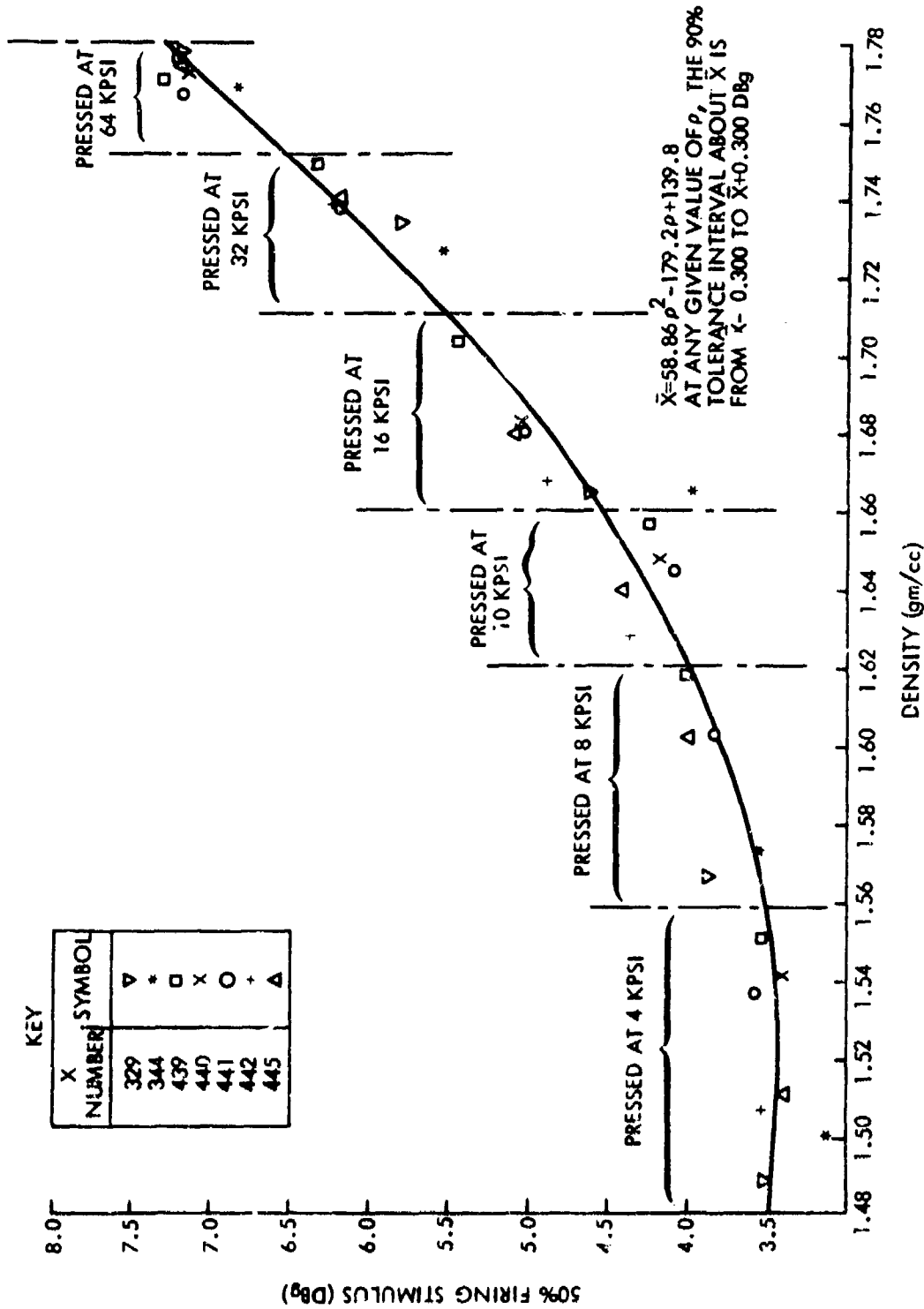


FIG. 9 SMALL-SCALE GAP TEST MEASUREMENT OF SENSITIVITIES OF VARIOUS CH-6's AS A FUNCTION OF CHARGE DENSITY

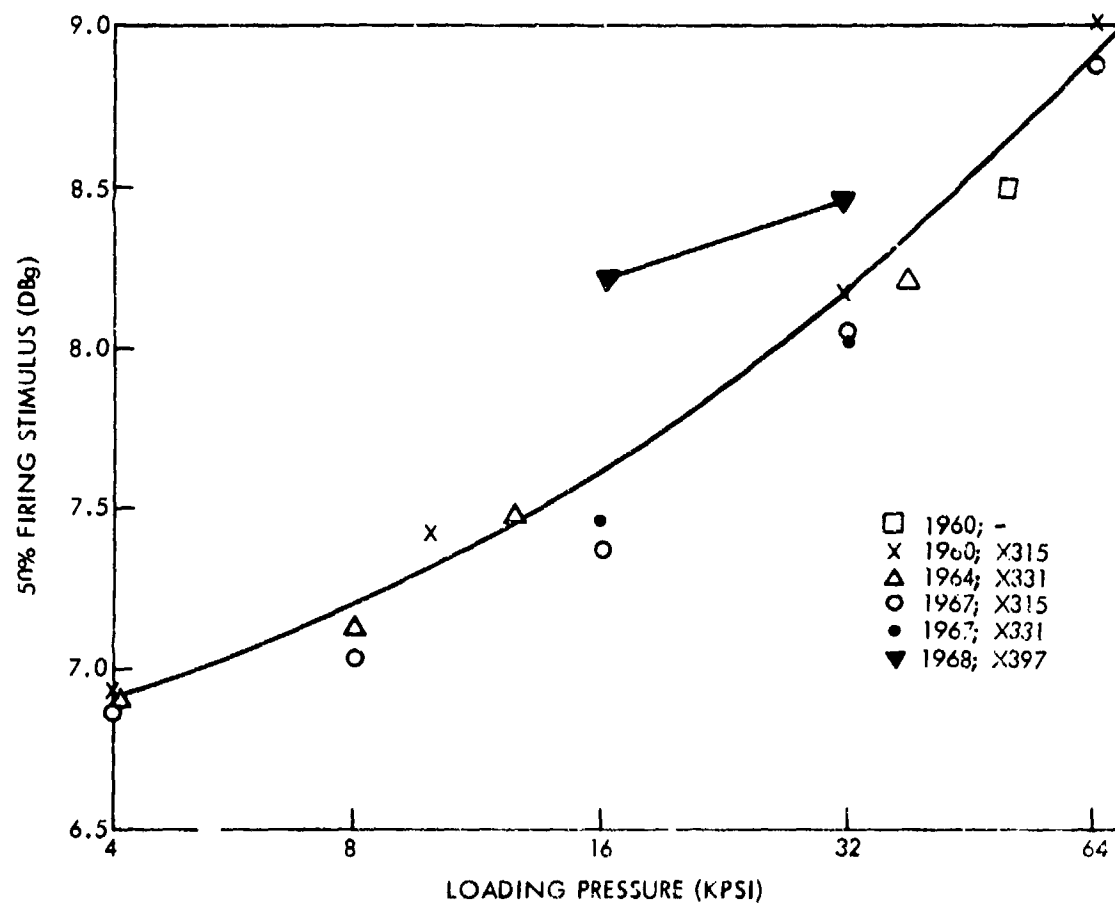


FIG. 10 COMPOSITE PLOT OF ALL DATB DATA SHOWING SENSITIVITY VS. LOADING PRESSURE

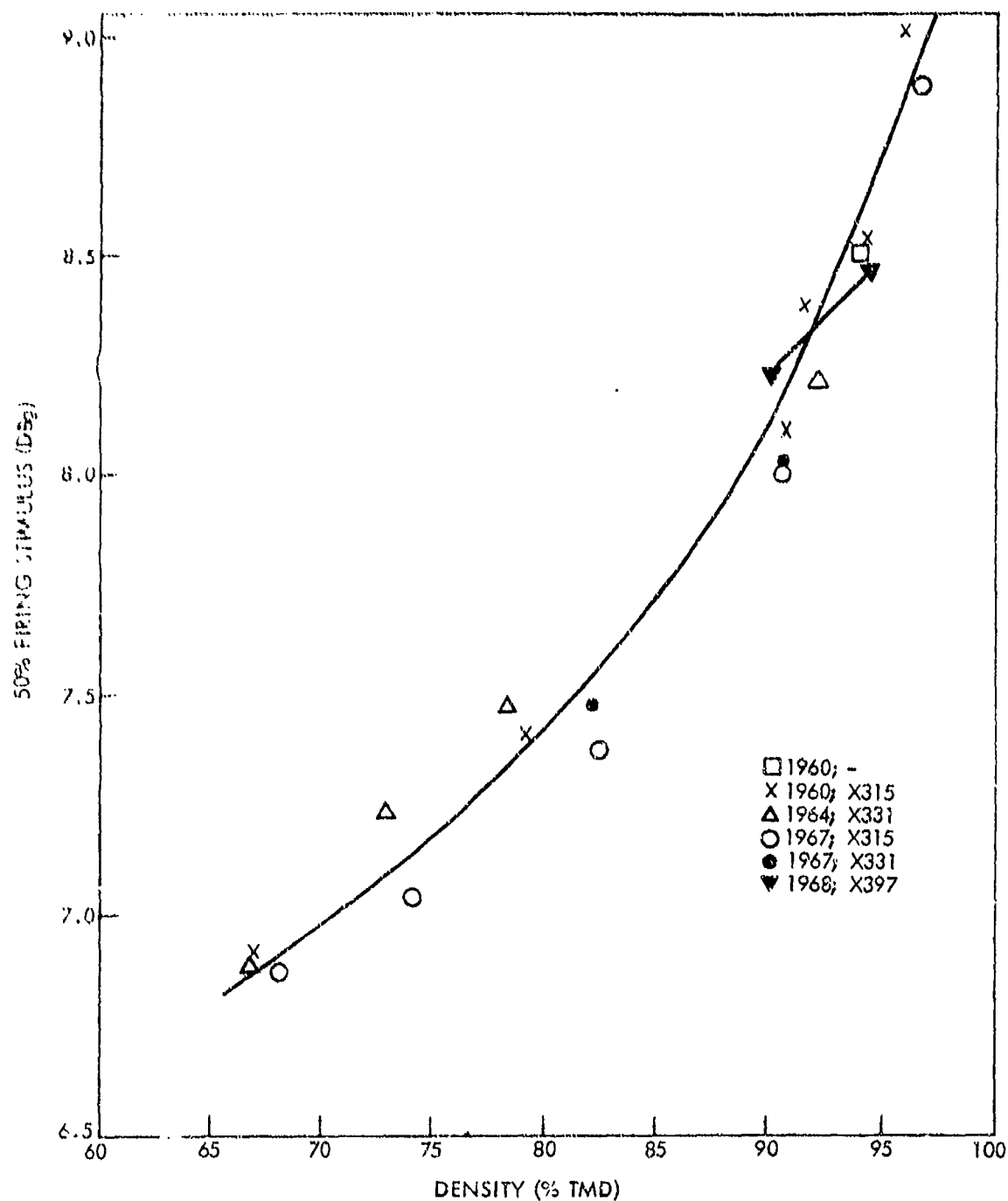


FIG. 11 COMPOSITE PLOT OF ALL DATB DATA SHOWING SENSITIVITY VS. DENSITY

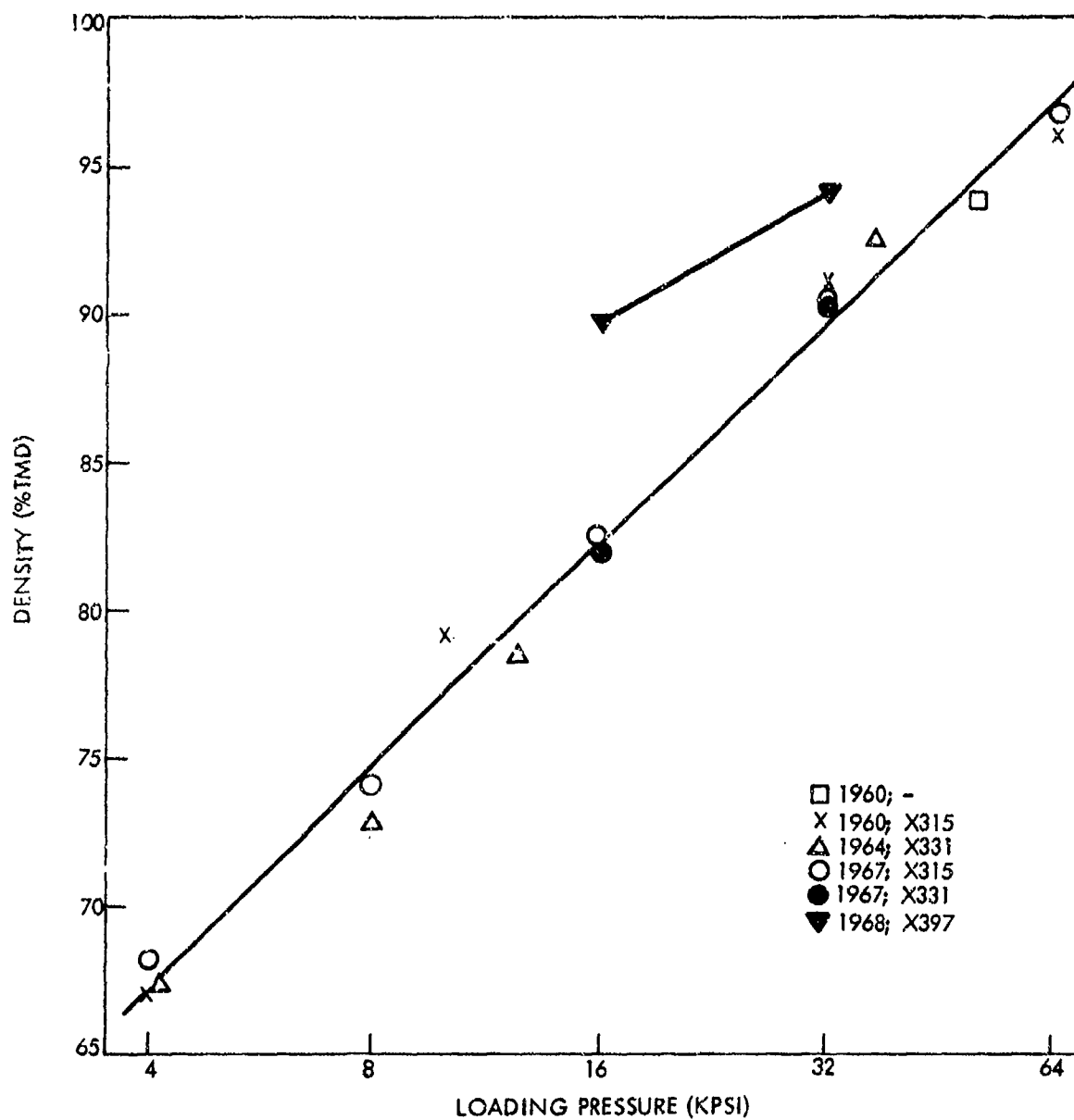


FIG. 12 COMPOSITE PLOT OF DATB SSGT LOADING COMPRESSIBILITY DATA

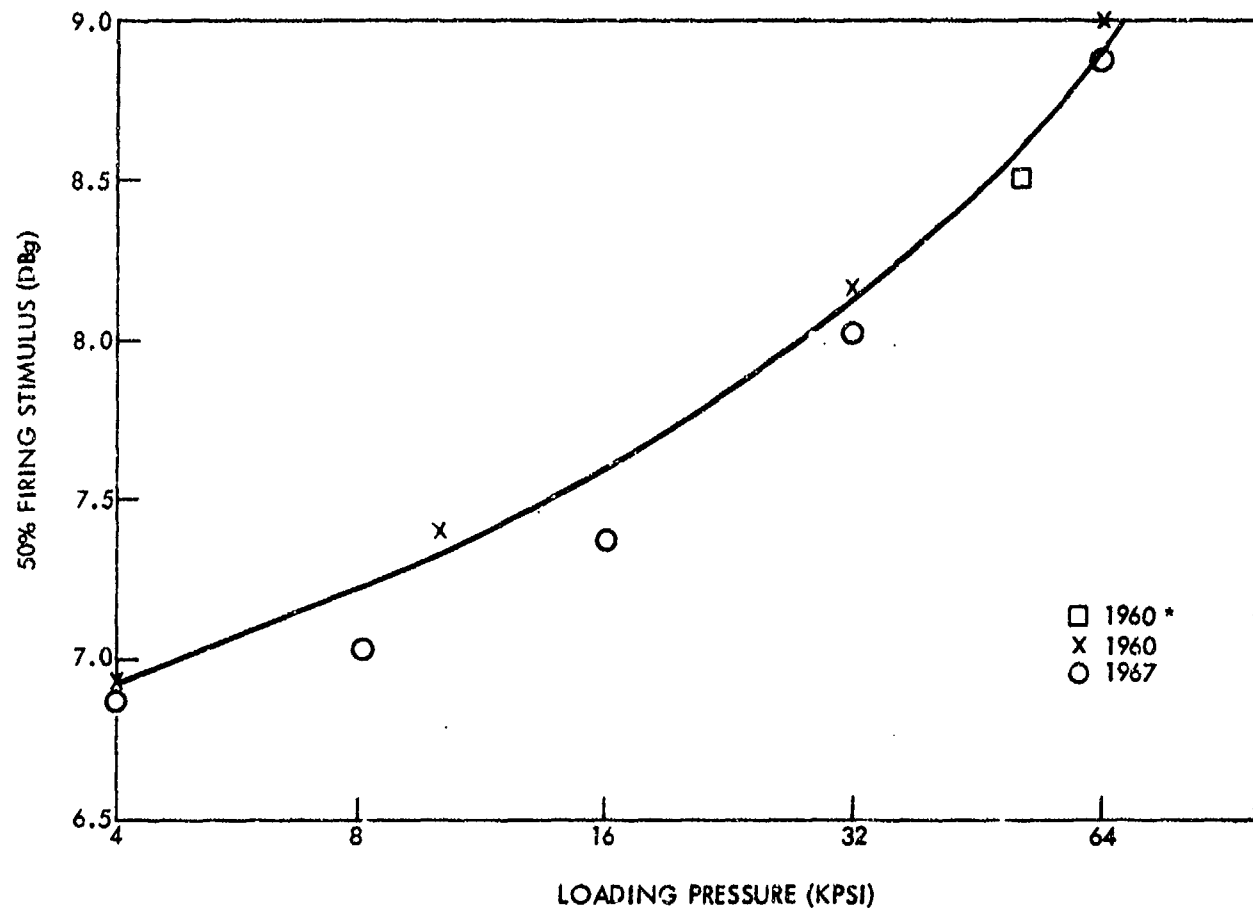
The data points of Figure 10 appear to be rather broadly scattered, particularly the two, connected by a straight line, for X No. 397, fired in 1968. However when the data are replotted to display sensitivity (the 50% firing stimulus) as a function of the density, as in Figure 11, we find that the points, (and even the two mavericks' fall much closer to the line. Inspection of Figure 12 shows that X No. 397 must be appreciably different from the rest of the DATB's tested. It has a different squish modulus: at the same consolidating pressure it compresses to a significantly higher density and is therefore less sensitive.\* At 16 KPSI, the sensitivity difference might be 0.6 DBg depending upon which of the two explosives happened to be chosen for loading. In some explosive train designs, the insertion of an explosive 0.6 DBg less sensitive than designed for could use up a large portion of the reliability reserve designed into the system; it could conceivably change a design from reliable to marginal.

5.5 Figures 13, 14, and 15 have been prepared to give some insight into time stability of the SSGT system. We point out that because of some confusion in our records we have information in Data Packs D1a, D1b, and D1c which we strongly suspect were all taken on the same explosive although we cannot so state categorically. The sensitivity versus loading pressure plot (Figure 13) seems to indicate that the more recent values indicate somewhat greater sensitivity. This trend is less marked for the sensitivity versus density plot (Figure 14) and if there is a significant difference (which we doubt, but have not subjected to statistical test) it could be said that the compressibility also has shifted (Figure 15) which in turn indicates that there has been a slight shift in the seven-year period 1960 to 1967.

5.6 RDX/STEARIC ACID STUDIES. As part of the program for finding a substitute for tetryl (as of 1973, no more tetryl will be manufactured by the military) a study was instituted to give more understanding of RDX/Stearic Acid mixtures of which the explosive composition A-5 is a member. Two-pound samples of each of six compositions, ranging from 0.3 to 9.7% of stearic acid were made at Picatinny Arsenal and sent to NOL for sensitivity measurements. The sensitivity and compressibility data (Data Packs G6a, G6b....G6f)

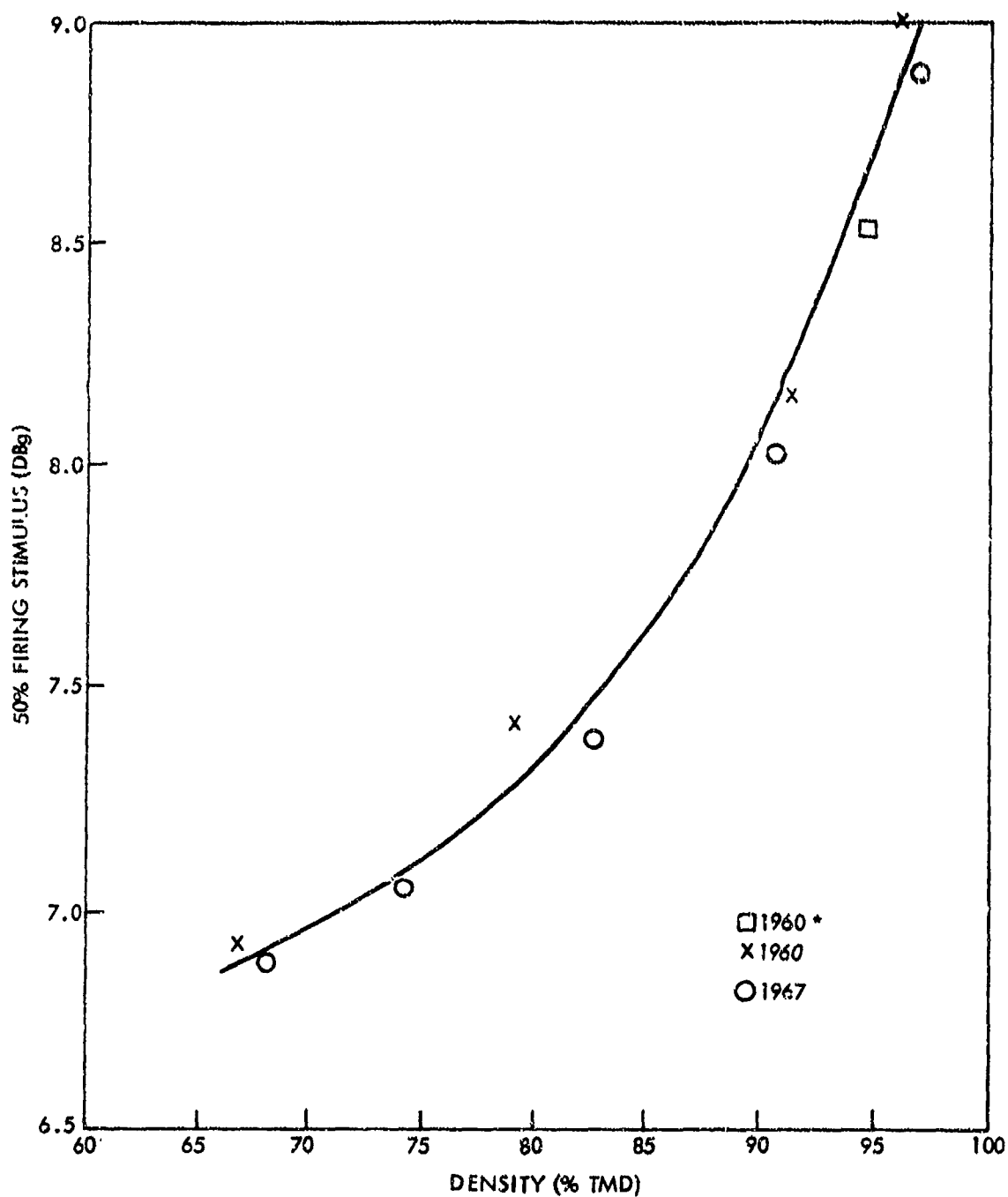
\*Reference to the appropriate pages of the Data Packs reveals that particle size differences exist which could in turn affect our measured parameters (See D1d2 and D1f2).





\* D1a; ASSUMED TO BE X315. SEE PARAGRAPH 5.5

FIG. 13 DATB (X315) TIME-SHIFT (1960 TO 1967) OF SENSITIVITY VS. LOADING PRESSURE



\* D1a; ASSUMED TO BE X315. SEE PARAGRAPH 5.5

FIG. 14 DATB (X315) TIME SHIFT (1960 TO 1967) OF SENSITIVITY VS. DENSITY

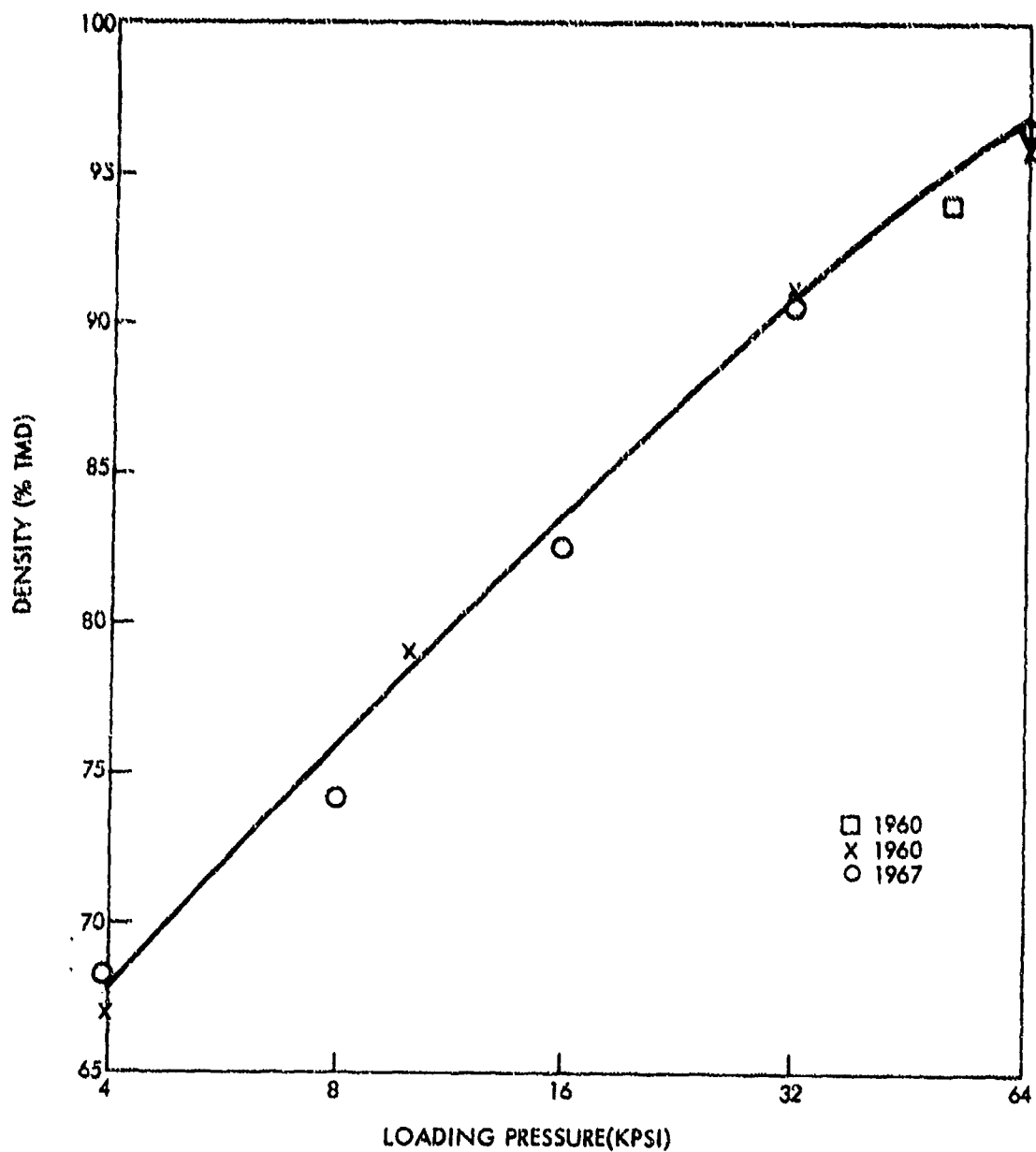


FIG. 15 DATB (X315) TIME SHIFT (1960 TO 1967) OF DENSITY VS. LOADING PRESSURE

when plotted as a function of chemical composition, showed irregularities which suggested that the coating of the RDX by stearic acid might not be uniform. Microscopic studies revealed that this was so -- that there were coated RDX crystals, uncoated crystals of RDX and free clumps of stearic acid. The degree of coating and the amount of free stearic acid, as a function of composition, could not be evaluated quantitatively except that the RDX appeared to be fully coated at the 3.3% and 9.7% stearic acid mixtures. For these two mixtures, however, we could not estimate how much free stearic acid there was.

5.8 We caution that the six mixtures probably do not represent truly the system of which A-5 is a member. That such may be the case is not too surprising since it is often very difficult to scale up or down chemical procedures which involve physical chemical processes such as adsorption, thin films, etc.

## 6. FINAL REMARKS

6.1 By way of an apology, we find that many of the Pages Two of the data packs are far from complete, sometimes containing only the name of the explosive. Any more traceability information, we fear, has been irretrievably lost. All too often we have come up against the attitude "TNT is TNT, is it not?" The correct attitude is, of course, "Well this batch of TNT just could be different from all others." But complete traceability can be accomplished only by foresight (not hindsight), much money, and mountains of documentation. Our friends in the Outer Space Industry and AEC have been able to perform exemplary jobs of "keeping track".

6.2 As we go to press (1973) we know that there is a considerable body of SSGT sensitivity data which are in varying degrees of readiness for publication but not yet complete. We have given available ancillary information, such as Impact Sensitivities (signified by the symbol  $\Sigma$ ) as measured on the Bureau of Mines Drop Tester at NOL; particle size data, and any notations inscribed on the record cards that could conceivably trigger off a chain of additional information. There are other sources at NOL, such as limited distribution and internal progress reports, declassified documents, and assorted project notebooks which may turn up little gems of information. We hope also that our readers will be able to contribute information that they have found on materials which can be identified by the same X No. and/or batch and lot numbers.

6.3 It is our expectation, as time and money becomes available, to distribute new and updated pages to be inserted into appropriate locations in the data packs, incorporating material such as that mentioned in the preceding paragraph.

REFERENCES

1. J. N. Ayres, "Standardization of the Small Scale Gap Test", NAVWEPS Report 7342, 16 Jan 1961
2. Statistical Research Group, "Princeton University", "Statistical Analysis for a New Procedure in Sensitivity Experiments", AMP Report 101.1R, SRG-P No. 40 (OSRD Report 4040), Jul 1944
3. W. J. Dixon and A. M. Mood, "A Method for Obtaining and Analyzing Sensitivity Data", Jour. of the Amer. Stat. Assoc., 43, 109-126, 1948
4. J. Berkson, "A Statistically Precise and Relatively Simple Method of Estimating the Bio-Assay with Quantal Response Based on the Logistic Function", Jour. of the Amer. Stat. Assoc., 48, 565-599, 1953
5. J. N. Ayres, L. D. Hampton, I. Kabik, and A. D. Solem, "Varicomp, A Method for Determining Detonation Transfer Probabilities (U)", NAVWEPS Report 7411, 30 Jun 1961
6. J. N. Ayres, L. D. Hampton, I. Kabik, "The Prediction of Very Low EED Functioning Levels", NOLTR 63-133, 4 Sep 1963
7. L. D. Hampton, J. N. Ayres, I. Kabik, "Estimation of High and Low Probability EED Functioning Levels", NOLTR 63-266, 3 Feb 1964
8. L. D. Hampton, "Monte Carlo Investigations of Small Sample Bruceton Tests", NOLTR 66-117, 1967
9. A. Golub and F. E. Grubbs, "Analysis of Sensitivity Experiments When the Levels of Stimulus Cannot be Controlled", Jour. of Amer. Stat. Assoc., 51 (1956), 257-265
10. L. D. Hampton, G. D. Blum, "Maximum Likelihood Logistic Analysis of Scattered Go/No-Go (Quantal) Data", NOLTR 64-238, (AD622199), 26 Aug 1965
11. L. J. Montesi, "Steel Dent Output of a Number of Common Explosives", Vol. I Unclassified Explosives, NOLTR 72-92, 25 May 1972
12. D. Price, and T. P. Liddiard, Jr. "The Small Scale Gap Test: Calibration and Comparison with the Large Scale Gap Test", NOLTR 66-87, 7 Jul 1966
13. "Safety and Performance Tests for Qualification of Explosives", NAVORD OD 44811, Vol. 1, 1 Jan 1972

TABLE A-1  
ALPHABETIC INDEX TO  
APPENDICES B THROUGH G

| Explosive Designation    | Appendix Location |
|--------------------------|-------------------|
| CH-6                     | C3                |
| Comp A-5                 | C5                |
| Comp B                   | C11               |
| Comp C-3                 | F1                |
| Comp C-4                 | F2                |
| DATB                     | D1                |
| DATB/BRL                 | E1                |
| DATB/Hytel (95/5)        | E2                |
| DATB/Hytel (90/10)       | E3                |
| DATB/TATB                | G4                |
| DATB/HNS-II              | G5                |
| DIPAM                    | D4                |
| EPM-2                    | F6                |
| H-6                      | C4                |
| HBX-3                    | C12               |
| HMX                      | B6                |
| HNAB                     | D3                |
| HNB                      | F5                |
| HNS-I                    | D7                |
| HNS-II                   | D8                |
| HNS-R                    | D6                |
| HNS-I/TEFLON-30 (95/5)   | E4                |
| HNS-II/TEFLON-30 (95/5)  | E11               |
| HNS-II/TEFLON-30 (90/10) | E5                |
| HNS-II/TEFLON-30 (90/10) | E6                |
| Lead Azide               | B1                |
| LX-04-0                  | E10               |
| KHND                     | B3                |
| Nitroguanidine           | C6                |
| Nitromannite             | B2                |
| Octol (75/25)            | C9                |
| Octol (65/35)            | C10               |

| Explosives Designation | Appendix Location |
|------------------------|-------------------|
| PBX 9407               | E9                |
| PBXC-6                 | E8                |
| PBXN-3                 | E7                |
| PBXN-5                 | E8                |
| PENTOLITE (50/50)      | C8                |
| PETN                   | B4                |
| PETN/DATB              | G2                |
| PETN/TATB              | G3                |
| PICRAMIDE              | D14               |
| RDX                    | B5                |
| RDX/Calcium Stearate   | G1                |
| RDX/Stearic Acid       | G6                |
| TACOT-2                | D5                |
| TATB                   | D2                |
| Tetryl, graphited.     | C2                |
| Tetryl, yellow         | C1                |
| TNB                    | D15               |
| TNEDV                  | F4                |
| TNETB                  | F3                |
| TNT                    | C7                |



TABLE A-2  
SYNOPTIC INDEX TO APPENDICES B THROUGH G

Appendix B  
(Initiating Explosives)

B1 Lead Azide  
B2 Nitromannite  
B3 KHND  
B4 PETN  
B5 RDX  
B6 HMX

Appendix C  
(Booster & Warhead Explosives)

C1 Yellow Tetryl  
C2 Graphited Tetryl  
C3 CH-6  
C4 H-6  
C5 Comp A-5  
C6 Nitroguanidine  
C7 TNT  
C8 Pentolite (50/50)  
C9 Octol (75/25)  
C10 Octol (65/35)  
C11 Comp B  
C12 HBX-3

Appendix D  
(Thermally Stable Explosives)

D1 DATB  
D2 TATB  
D3 HNAB  
D4 DIPAM  
D5 TACOT-8  
D6 HNS-R  
D7 HNS-I  
D8 HNS-II  
D9 See Vol. II  
D10 See Vol. II  
D11 See Vol. II  
D12 See Vol. II  
D13 See Vol. II  
D14 DICRAMIDE  
D15 TNB

Appendix E  
(Plastic-Bonded Explosives)

E1 DATB/BRL (95/5)  
E2 DATB/Eytel (95/5)  
E3 DATB/Eytel (90/10)  
E4 HNS-I/TEFLON-30 (95/5)  
E5 HNS-II/TEFLON-30 (90/10)  
E6 HNS-II/TEFLON-7c (90/10)  
E7 PBXN-3  
E8 PBXN-5 (also PBXC-6)  
E9 PBX-9407  
E10 LX-04-0  
E11 HNS-II/TEFLON-30 (95/5)  
E12 See Vol. II

Appendix F  
(Miscellaneous Explosives)

F1 Comp C-3  
F2 TNETB  
F3 TNETB  
F4 TNEDV  
F5 HNB  
F6 EPM-2

Appendix G  
(Variable Composition Series)

G1 RDX/Calcium Stearate  
G2 PETN/DATB  
G3 PETN/TATB  
G4 DATB/TATB  
G5 DATB/HNS-II  
G6 RDX/Stearic Acid

TABLE A-3  
LIST OF DATA PACKS

| Page<br>Number | Explosive          | X<br>Number | ID<br>Number |
|----------------|--------------------|-------------|--------------|
| APPENDIX B     |                    |             |              |
| B1a            | Lead Azide         | -           | -            |
| B2a            | Nitromannite       | 601         | 26           |
| B3a            | KHND               | 616         | 1001         |
| B4a            | PETN               | 321         | -            |
| B4b            | PETN               | 321         | 1227         |
| B5a            | RDX                | 189         | -            |
| B5b            | RDX                | 414         | -            |
| B6a            | HMX                | -           | -            |
| APPENDIX C     |                    |             |              |
| C1a            | Tetryl (Yellow)    | 102         | -            |
| C2a            | Tetryl (Graphited) | 460         | -            |
| C2b            | Tetryl (Graphited) | 460         | 374          |
| C2c            | Tetryl (Graphited) | 672         | 896          |
| C3a            | CH-6               | Misc        | -            |
| C3b            | CH-6               | 329         | -            |
| C3c            | CH-6               | 344         | -            |
| C3d            | CH-6               | 439         | -            |
| C3e            | CH-6               | 440         | -            |
| C3f            | CH-6               | 441         | -            |
| C3g            | CH-6               | 442         | -            |
| C3h            | CH-6               | 445         | -            |
| C3i            | CH-6               | 702         | 1062         |
| C4a            | H-6                | -           | CH 4171      |
| C4b            | H-6                | -           | -            |
| C5a            | Comp A-5           | 815         | 1641         |
| C6a            | Nitroguanidine     | 547         | -            |

# NOLTR 73-132

|      |                   |     |         |
|------|-------------------|-----|---------|
| C7a  | TNT               | 159 | -       |
| C7b  | TNT               | 412 | -       |
| C7c  | TNT               | -   | -       |
| C8a  | PENTOLITE (50/50) | 551 | -       |
| C9a  | Octol (75/25)     | 469 | -       |
| C10a | Octol (65/35)     | 293 | -       |
| C11a | Comp B            | 279 | 8311    |
| C11b | Comp B            | 479 | -       |
| C11c | Comp B            | 576 | -       |
| C12a | HBX-3             | -   | CH 4170 |

## APPENDIX D

|     |           |          |           |
|-----|-----------|----------|-----------|
| D1a | DATB      | -        | -         |
| D1b | DATB      | 315      | -         |
| D1c | DATB      | 315      | 185 & 921 |
| D1d | DATB      | 331      | -         |
| D1e | DATB      | 331      | 920       |
| D1f | DATB      | 397      | 922       |
| D2a | TATB      | 335      | -         |
| D2b | TATB      | 406      | -         |
| D3a | HNAB      | 511, 512 | -         |
| D3b | HNAB      | 518      | -         |
| D4a | DIPAM     | 346      | -         |
| D4b | DIPAM     | 402      | -         |
| D4c | DIPAM     | 428      | -         |
| D4d | DIPAM     | 452, 453 | -         |
| D4e | DIPAM     | 491      | -         |
| D4f | DIPAM     | 546      | -         |
| D4g | DIPAM     | 549      | -         |
| D5a | TACOT-8   | 330      | -         |
| D6a | HNS-R     | 401      | -         |
| D7a | HNS-I     | 498      | -         |
| D7b | HNS-I     | 534      | -         |
| D7c | HNS-I     | 537      | -         |
| D7d | HNS-I     | 537      | -         |
| D7e | HNS-I     | 539      | -         |
| D7f | HNS-I (B) | 565      | -         |
| D7g | HNS-I (B) | 705      | 1071      |
| D7h | HNS-I     | 716      | 1090      |

NOLTR 73-132

|     |        |      |      |
|-----|--------|------|------|
| D8a | HNS-II | -    | Misc |
| D8b | HNS-II | Misc | -    |
| D8c | HNS-II | 528  | -    |
| D8d | HNS-II | 550  | -    |
| D8e | HNS-II | Misc | -    |

|      |           |     |   |
|------|-----------|-----|---|
| D9a  | (Vol II)  | -   | - |
| D10a | (Vol II)  | -   | - |
| D11a | (Vol II)  | -   | - |
| D12a | (Vol II)  | -   | - |
| D12b | (Vol II)  | -   | - |
| D13a | (Vol II)  | -   | - |
| D14a | PICRAMIDE | 405 | - |
| D15a | TNE       | -   | - |

APPENDIX E

|     |                          |     |               |
|-----|--------------------------|-----|---------------|
| E1a | DATB/BRL (95/5)          | -   | 2271          |
| E2a | DATB/Hytel (95/5)        | 322 | -             |
| E2b | DATB/Hytel (95/5)        | 327 | -             |
| E3a | DATB/Hytel (90/10)       | 326 | -             |
| E4a | HNS-I/TEFLON-30 (95/5)   | 444 | -             |
| E4b | HNS-I/TEFLON-30 (95/5)   | 467 | -             |
| E4c | HNS-I/TEFLON-30 (95/5)   | 525 | -             |
| E4d | HNS-I/TEFLON-30 (95/5)   | 526 | -             |
| E4e | HNS-I/TEFLON-30 (95/5)   | 540 | -             |
| E5a | HNS-II/TEFLON-30 (90/10) | 571 | -             |
| E5b | HNS-II/TEFLON-30 (90/10) | 571 | -             |
| E5c | HNS-II/TEFLON-30 (90/10) | 571 | -             |
| E5d | HNS-II/TEFLON-30 (90/10) | 581 | -             |
| E5e | HNS-II/TEFLON-30 (90/10) | 581 | -             |
| E6a | HNS-II/TEFLON-7c (90/10) | -   | 1462          |
| E6b | HNS-II/TEFLON-7c (90/10) | 757 | 1493          |
| E6c | HNS-II/TEFLON-7c (90/10) | -   | 1541          |
| E7a | PBXN-3                   | 474 | 1507          |
| E8a | PBXC-6                   | 419 | 437, 438, 441 |
| E8b | PBXN-5                   | 618 | 579           |
| E8c | PBXN-5                   | 619 | 580           |
| E8d | PBXN-5                   | 715 | 1120          |

NOLTR 73-132

|      |                         |     |      |
|------|-------------------------|-----|------|
| E9a  | PBX-9407                | -   | 1467 |
| E10a | LX-04-0                 | -   | 1505 |
| E11a | HNS-II/TEFLON-3C (95/5) | 533 | -    |
| E12a | (Vol II)                | -   | -    |

APPENDIX F

|     |          |     |   |
|-----|----------|-----|---|
| F1a | Comp C-3 | -   | - |
| F2a | Comp C-4 | 524 | - |
| F3a | TNETB    | 563 | - |
| F4a | TNETV    | 579 | - |
| F5a | HNB      | 501 | - |
| F6a | EPN-2    | -   | - |

APPENDIX G

|      |            |             |     |   |
|------|------------|-------------|-----|---|
| G1a  | RDX/CA-ST. | (99.4/0.6)  | 348 | - |
| G1b  | RDX/CA-ST. | (99.3/0.7)  | 302 | - |
| G1c  | RDX/CA-ST. | (99.2/0.8)  | 349 | - |
| G1d  | RDX/CA-ST. | (98.6/1.4)  | 208 | - |
| G1e  | RDX/CA-ST. | (98.3/1.7)  | 350 | - |
| G1f  | RDX/CA-ST. | (98.0/2.0)  | 215 | - |
| G1g  | RDX/CA-ST. | (98.0/2.0)  | 281 | - |
| G1h  | RDX/CA-ST. | (97.5/2.5)  | 353 | - |
| G1i  | RDX/CA-ST. | (97.2/2.8)  | 209 | - |
| G1j  | RDX/CA-ST. | (97.2/2.8)  | 282 | - |
| G1k  | RDX/CA-ST. | (96.7/3.3)  | 354 | - |
| G1l  | RDX/CA-ST. | (96.0/4.0)  | 210 | - |
| G1m  | RDX/CA-ST. | (96.0/4.0)  | 283 | - |
| G1n  | RDX/CA-ST. | (95.0/5.0)  | 358 | - |
| G1o  | RDX/CA-ST. | (94.4/5.6)  | 211 | - |
| G1p  | RDX/CA-ST. | (93.9/6.1)  | 362 | - |
| G1q  | RDX/CA-ST. | (92.0/8.0)  | 212 | - |
| G1r  | RDX/CA-ST. | (92.0/8.0)  | 285 | - |
| G1s  | RDX/CA-ST. | (90.8/9.2)  | 366 | - |
| G1t  | RDX/CA-ST. | (89.0/11.0) | 286 | - |
| G1u  | RDX/CA-ST. | (88.9/11.1) | 370 | - |
| G1v  | RDX/CA-ST. | (88.7/11.3) | 216 | - |
| G1w  | RDX/CA-ST. | (87.2/12.8) | 374 | - |
| G1x  | RDX/CA-ST. | (85.8/14.2) | 378 | - |
| G1y  | RDX/CA-ST. | (85.0/15.0) | 287 | - |
| G1z  | RDX/CA-ST. | (84.2/15.8) | 217 | - |
| G1aa | RDX/CA-ST. | (84.2/15.8) | 288 | - |
| G1bb | RDX/CA-ST. | (83.4/16.6) | 381 | - |

NOLTR 73-132

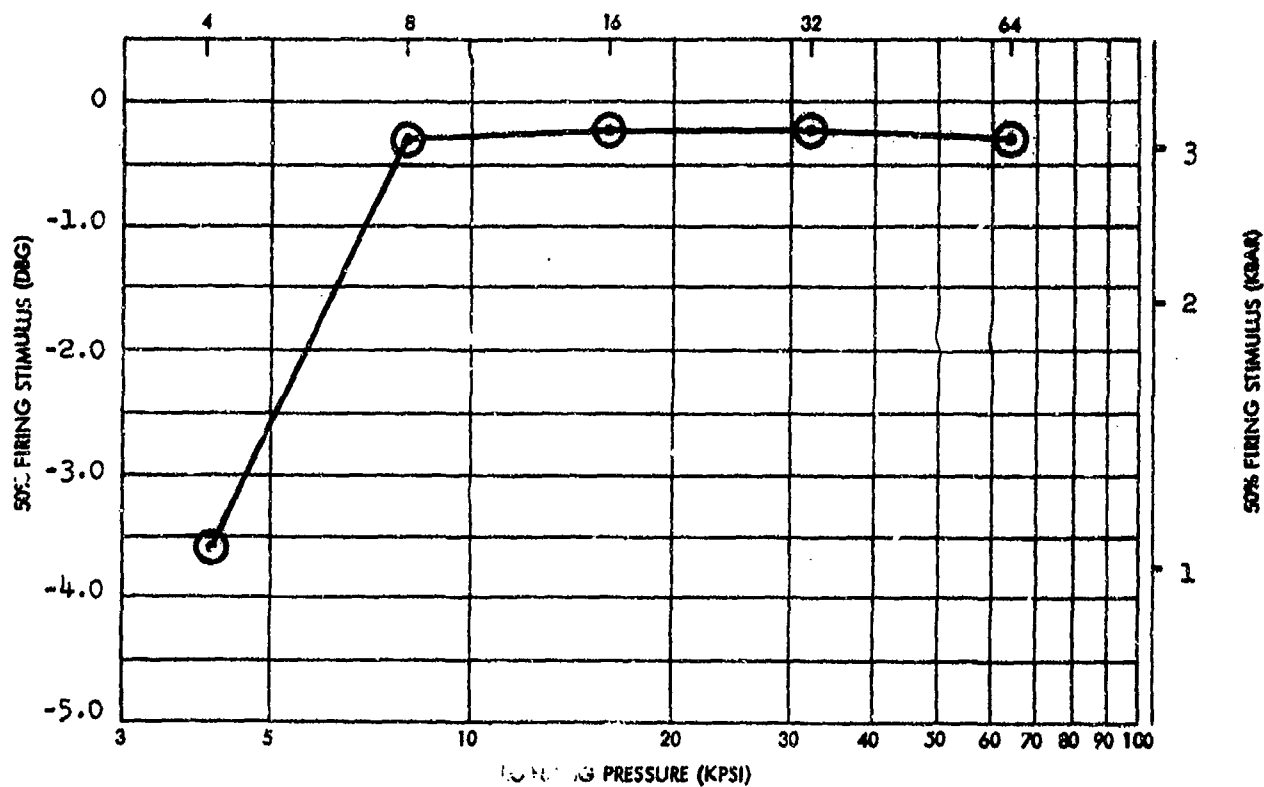
|      |             |             |     |      |
|------|-------------|-------------|-----|------|
| G1cc | RDX/CA-ST.  | (81.3/18.7) | 384 | -    |
| G1dd | RDX/CA-ST.  | (78.5/21.5) | 385 | -    |
| G1ee | RDX/CA-ST.  | (76.2/23.8) | 386 | -    |
| G1ff | RDX/CA-ST.  | (74.0/26.0) | 291 | -    |
| G1gg | RDX/CA-ST.  | (71.2/28.8) | 219 | -    |
| G2a  | PETN/DATB   | (75/25)     | 507 | -    |
| G2b  | PETN/DATB   | (50/50)     | 505 | -    |
| G2c  | PETN/DATB   | (25/75)     | 506 | -    |
| G2d  | PETN/DATB   | (15/85)     | 555 | -    |
| G2e  | PETN/DATB   | (5/95)      | 556 | -    |
| G3a  | PETN/TATB   | (50/50)     | 508 | -    |
| G4a  | DATB/TATB   | (50/50)     | 509 | -    |
| G5a  | DATB/HNS-II | (75/25)     | 569 | -    |
| G5b  | DATB/HNS-II | (50/50)     | 566 | -    |
| G6a  | RDX/ST-AC   | (99.7/0.3)  | 822 | 1670 |
| G6b  | RDX/ST-AC   | (99.4/0.6)  | 823 | 1671 |
| G6c  | RDX/ST-AC   | (99.2/0.8)  | 824 | 1672 |
| G6d  | RDX/ST-AC   | (98.8/1.2)  | 825 | 1673 |
| G6e  | RDX/ST-AC   | (96.7/3.3)  | 826 | 1674 |
| G6f  | RDX/ST-AC   | (90.3/9.7)  | 827 | 1675 |

|           |                  |           |   |
|-----------|------------------|-----------|---|
| EXPLOSIVE | LEAD AZIDE, DEX. | X NO.     | - |
| TMD       | 4.71             | I. D. NO. | - |

Date of Test  
3/64

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 4                       | 2.535                         | 0.0280 | 53.8  | -3.622            | -      | -              | 18 | (1)     |
| 8                       | 2.775                         | 0.0215 | 58.9  | -0.302            | 0.3017 | 0.1839         | 18 |         |
| 16                      | 3.074                         | 0.0155 | 65.3  | -0.239            | 0.1672 | 0.0879         | 18 |         |
| 32                      | 3.361                         | 0.0215 | 71.4  | -0.227            | 0.0961 | 0.0558         | 18 |         |
| 64                      | 3.663                         | 0.0237 | 77.8  | -0.303            | 0.3370 | 0.2120         | 18 |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
LEAD AZIDE, DEX.

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: LEAD ARIDE, DEX.

X NO.:            ID:            Z NO.:            SSGT LOAD ORDER NO.: 969

SOURCE:

CHEMICAL NAME: LEAD ARIDE, DEXTRINATED

DATE RECEIVED:                      LOT NO.:

INITIAL QUANTITY:                      BATCH NO.:

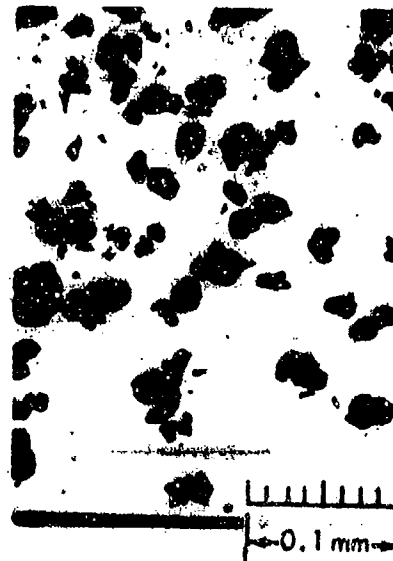
MANUFACTURED BY:                      IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

# =            cm

s =            log units

n =

Remarks



B 1 a 2 .

4 Sep 1973

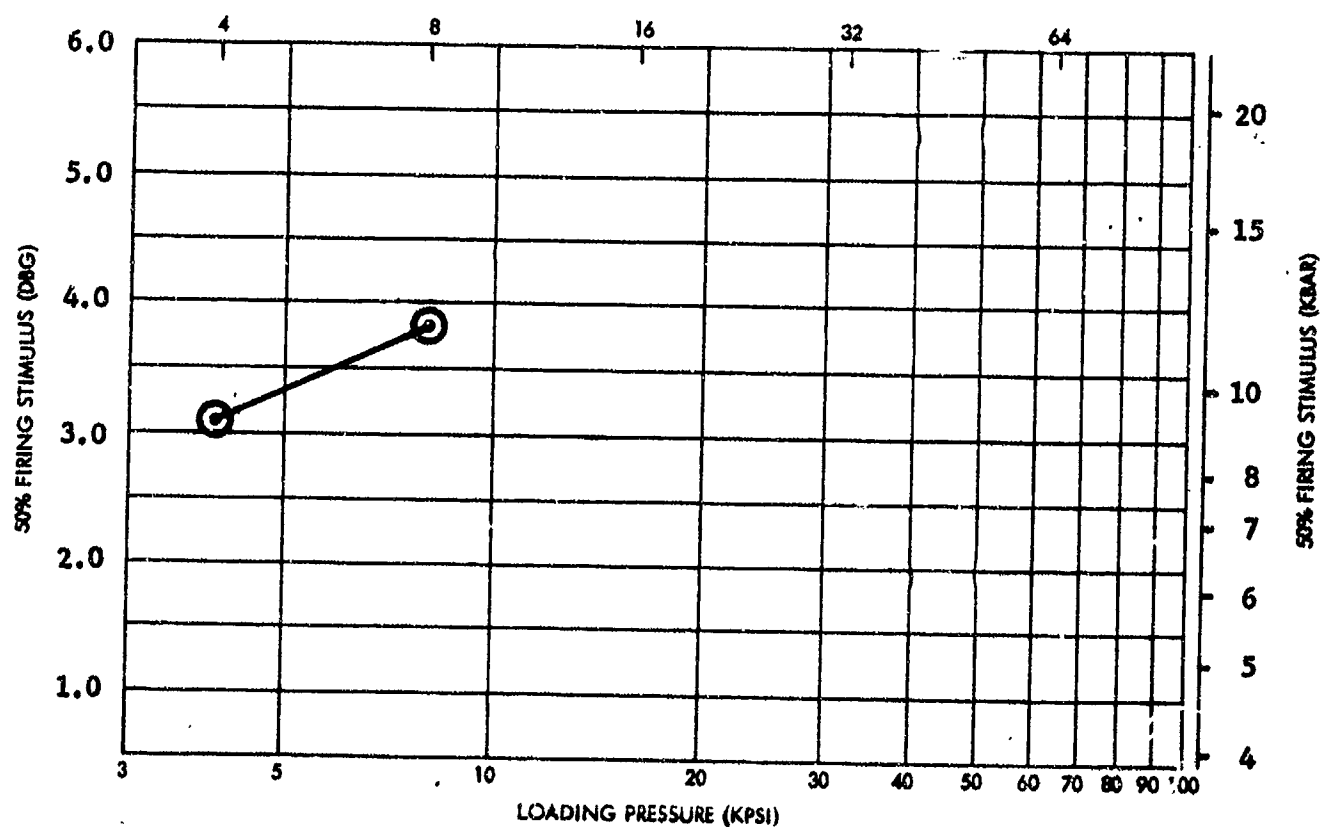


EXPLOSIVE NITROMANNITEX NO. 601

Date of Test

TMD 1.73I. D. NO. 267/67

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 1                       | 0.957                         | 0.0186 | 55.3  | 1.967             | 0.2514 | 0.1269         | 20 |         |
| 2                       | 1.113                         | 0.0124 | 64.3  | 2.968             | 0.0426 | 0.0269         | 20 |         |
| 4                       | 1.293                         | 0.0081 | 74.7  | 3.103             | 0.0531 | 0.0308         | 20 |         |
| 8                       | 1.458                         | 0.0063 | 84.3  | 3.820             | 0.0401 | 0.0294         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
NITROMANNITE

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: NITROMANNITE

X NO.: 601

ID: 26

Z NO.:

SSGT LOAD ORDER NO.: 1181

SOURCE:

CHEMICAL NAME: HEXANITROMANNITE

DATE RECEIVED: 7/27/67

LOT NO.: 12

INITIAL QUANTITY: 1 pound

BATCH NO.:

MANUFACTURED BY:

Atlas Chemical Company  
Wilmington, Del.

IMPACT SENSITIVITY (# or 50# point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

Rcvd & stored wet. Drying  
procedure 120°F, under vacuum,  
overnight.

E 2 a 2

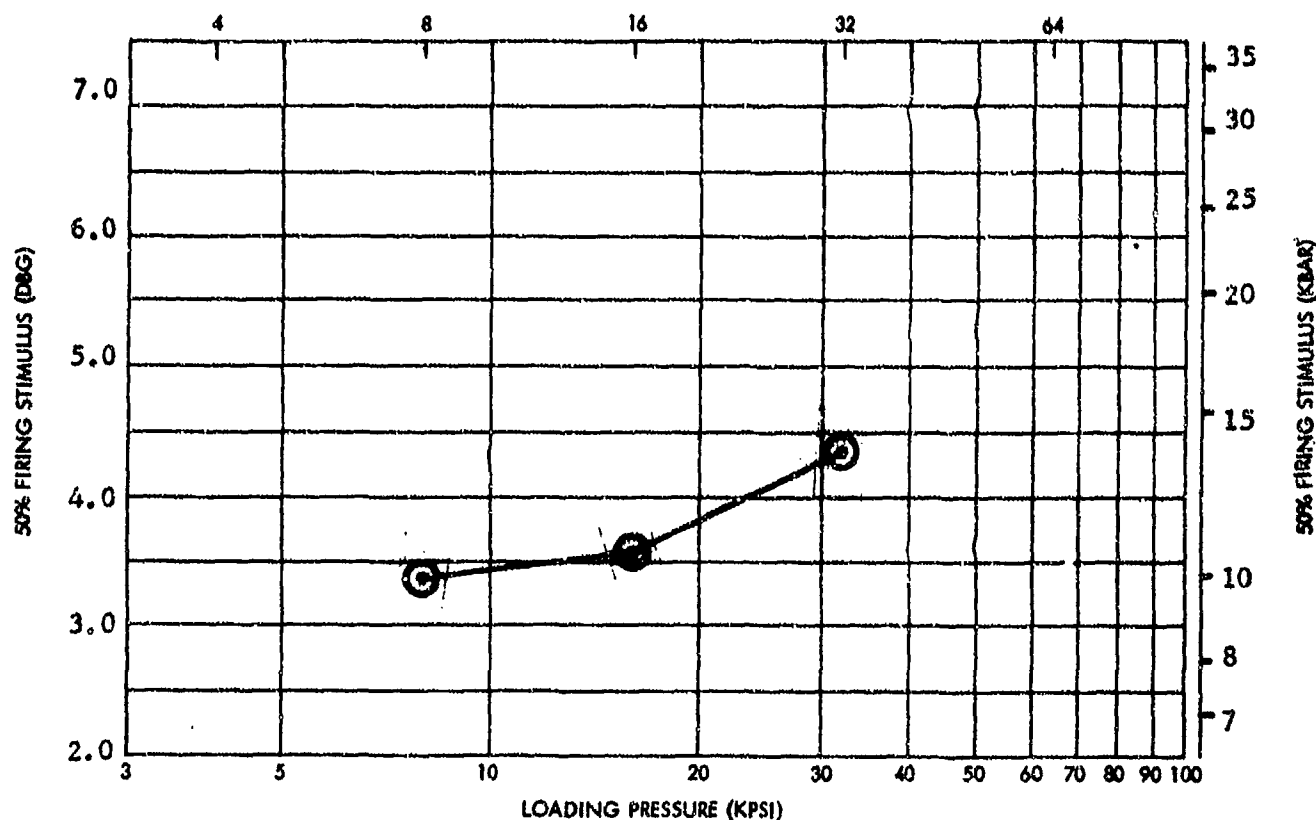
4 Sep 1973

EXPLOSIVE | KIND  
YMD

X NO. | 616  
I. D. NO. | 1001

Date of Test  
9/67

| LOADING PRESSURE (KPSI) | DENSITY (KMA/CM <sup>3</sup> ) |        | % YMD | SENSITIVITY (D&G) |        |                |    | REMARKS |
|-------------------------|--------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                           | s      |       | AVG.              | g      | K <sub>m</sub> | N  |         |
| 8                       | 1.438                          | 0.0187 | "     | 3.370             | 0.0231 | 0.0188         | 20 |         |
| 16                      | 1.577                          | 0.0126 | "     | 3.604             | 0.0183 | 0.0159         | 20 |         |
| 32                      | 1.697                          | 0.0089 | "     | 4.357             | 0.0165 | 0.0152         | 20 |         |
|                         |                                |        |       |                   |        |                |    |         |
|                         |                                |        |       |                   |        |                |    |         |
|                         |                                |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
KHND

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: KHND

X NO.: 616 ID: 1001 Z NO.: 766 SSGT LOAD ORDER NO.: 1193

SOURCE: NOL, (B310 Dacons), Rcvd Initiation Research Group  
227 grams in plastic bag, 26 Sep 67

CHEMICAL NAME: Potassium Hexanitrodiphenylamine

DATE RECEIVED: 3/1/65

LOT NO.: 251-98

INITIAL QUANTITY: 3.2 pounds

BATCH NO.: 1,2,3,4,6,7

MANUFACTURED BY:

American Cyanamide  
New Castle, Penn.

IMPACT SENSITIVITY (s or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

s = 26 cm

s = 0.07 log units

n =

Remarks

B 3 a 2

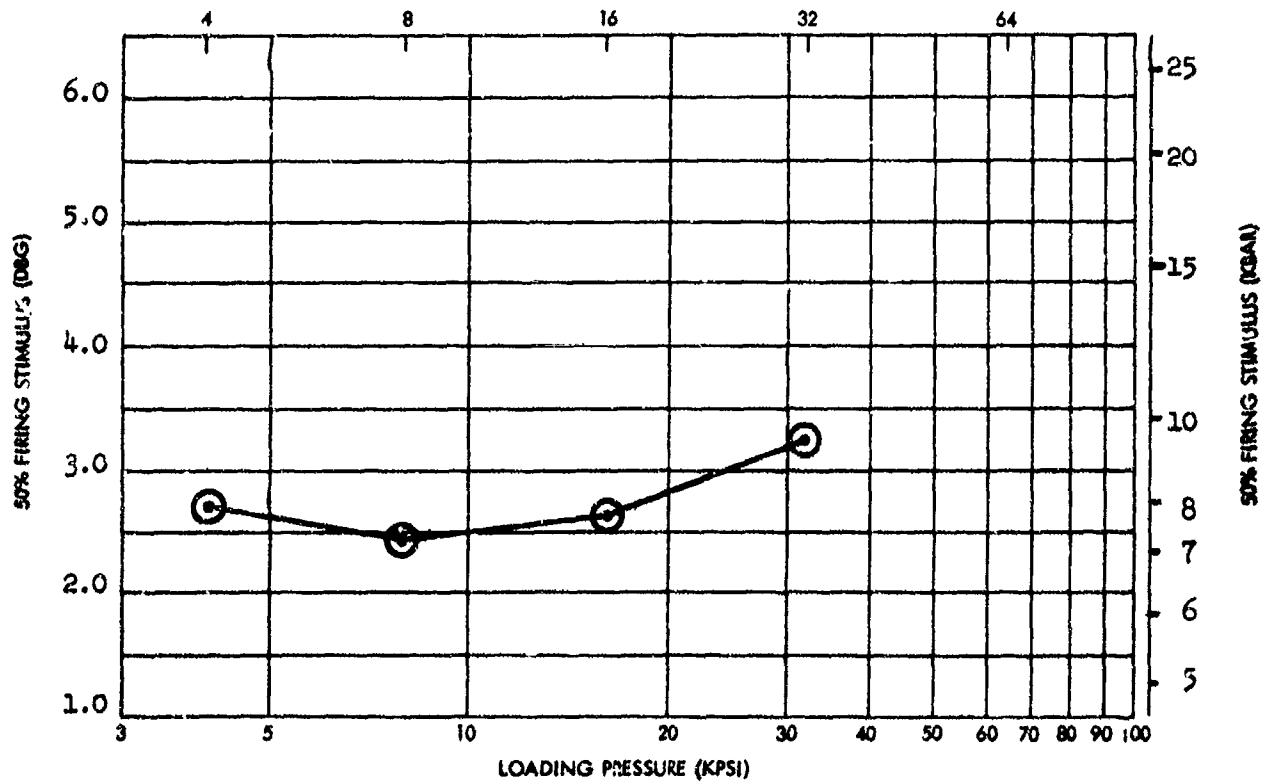
4 Sep 1973

|           |      |           |     |
|-----------|------|-----------|-----|
| EXPLOSIVE | PETN | X NO.     | 321 |
| TMD       | 1.78 | I. D. NO. | -   |

Date of Test  
5/66

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | s      | s <sub>m</sub> | N  |         |
| 4                       | 1.355                         | 0.0053 | 76.1  | 2.726             | 0.0206 | 0.0215         | 18 |         |
| 8                       | 1.440                         | 0.0049 | 80.9  | 2.476             | 0.0939 | 0.0555         | 18 |         |
| 16                      | 1.576                         | 0.0058 | 88.5  | 2.621             | 0.0101 | 0.0106         | 18 |         |
| 32                      | 1.681                         | 0.0041 | 94.4  | 3.258             | -      | -              | 18 | (1)     |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone.



SMALL SCALE GAP TEST (SSGT) DATA  
PETN

B4a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PETN Special (Sic) AN-P387 Class B

X NO.: 321 ID: Z NO.: SSGT LOAD ORDER NO.: 1122

SOURCE:

CHEMICAL NAME: Pentaerythrite Tetranitrate

DATE RECEIVED: 7/7/60

LOT NO.:

INITIAL QUANTITY: 200 pounds

BATCH NO.:

MANUFACTURED BY:  
Ravenna Arsenal, Ohio

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

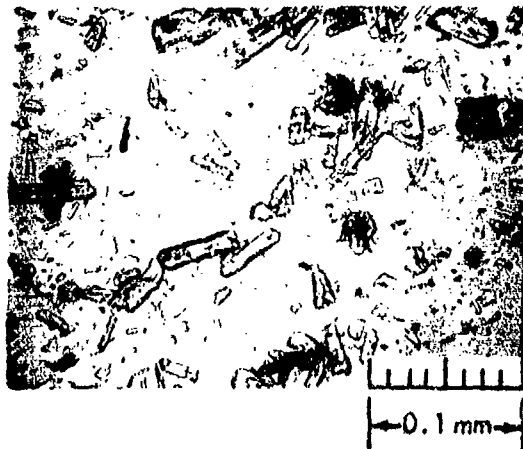
DATE OF TEST

|          | I         | TRIAL | II    |
|----------|-----------|-------|-------|
| s = 14   | cm        |       | 16    |
| s = 0.11 | log units |       | <0.05 |
| n = 25   |           |       | 25    |

Remarks

100 Gram Sieve Analysis, 1 Hour\*

| Mesh Size |     | Amount |
|-----------|-----|--------|
| Through   | On  | (%)    |
|           | 40  | 0.53   |
| 40        | 70  | 3.69   |
| 70        | 100 | 47.67  |
| 100       | 140 | 30.03  |
| 140       | 170 | 4.22   |
| 170       | 200 | 1.17   |
| 200       | PAN | 12.69  |



\*Assumed that this notation  
indicates 1 hour sieve time.

B 4 a 2

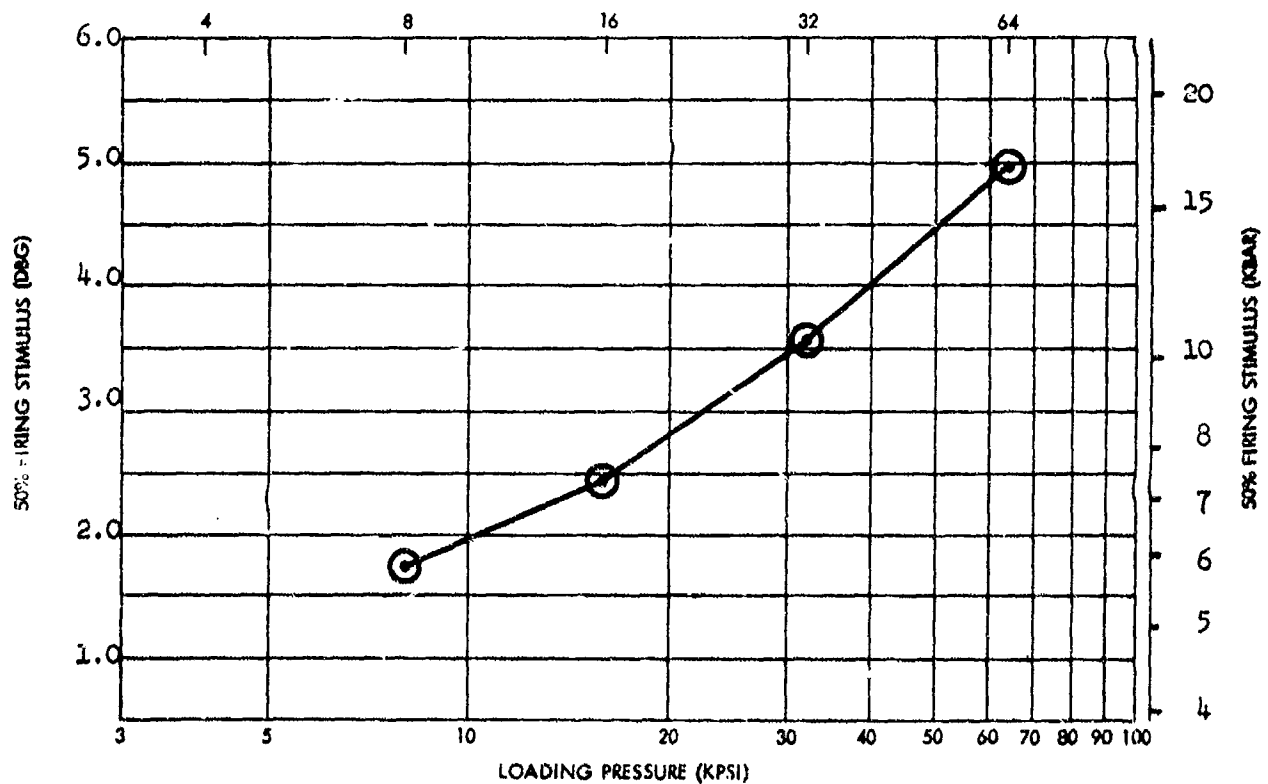
4 Sep 1973

EXPLOSIVE PETN  
TMD 1.78

X NO. 321  
I. D. NO. 1227

Date of Test  
4/70

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.499                         | 0.0065 | 84.2  | 1.725             | 0.5416 | 0.2529         | 22 |         |
| 16                      | 1.600                         | 0.0058 | 89.9  | 2.468             | 0.0459 | 0.2568         | 23 |         |
| 32                      | 1.708                         | 0.0047 | 96.0  | 3.555             | 0.0918 | 0.0445         | 23 |         |
| 64                      | 1.775                         | 0.0057 | 99.7  | 4.998             | 0.0158 | 0.0167         | 23 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
PETN

B4b1

4 Sep 1973

## CHEMICAL DATA

EXPLOSIVE NAME: PETN SPECIAL (Sic) AN-P387 Class B

X NO.: 321

ID: 1227

Z NO.:

SSGT LOAD ORDER NO.: 1294

SOURCE:

CHEMICAL NAME: Pentaerythrite Tetranitrate

DATE RECEIVED: 7/7/60

LOT NO.:

INITIAL QUANTITY: 200 pounds

BATCH NO.:

MANUFACTURED BY:  
Ravenna Arsenal, OhioIMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

|                | I  | TRIAL | II |
|----------------|----|-------|----|
| $\bar{x}$ = 14 | cm |       | 16 |

s = 0.21 log units &lt; 0.05

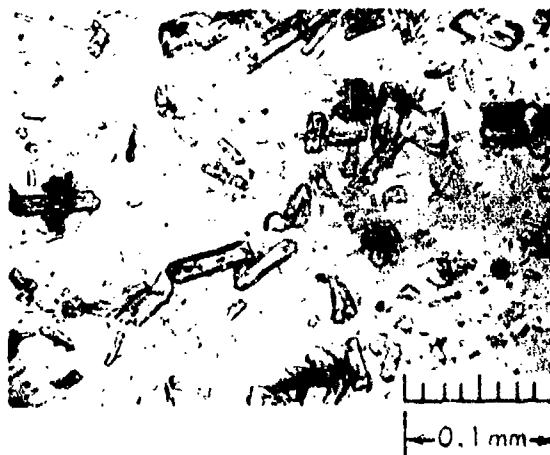
n = 25 25

## Remarks

\*Dried 31 Mar 70

100 Gram Sieve Analysis, 1 Hour\*

| Mesh Size |     | Amount<br>(%) |
|-----------|-----|---------------|
| Through   | On  |               |
|           | 40  | 0.53          |
| 40        | 70  | 3.69          |
| 70        | 100 | 47.67         |
| 100       | 140 | 30.03         |
| 140       | 170 | 4.22          |
| 170       | 200 | 1.17          |
| 200       | PAN | 12.69         |

\*Assumed that this notation  
indicates 1 hour sieve time.

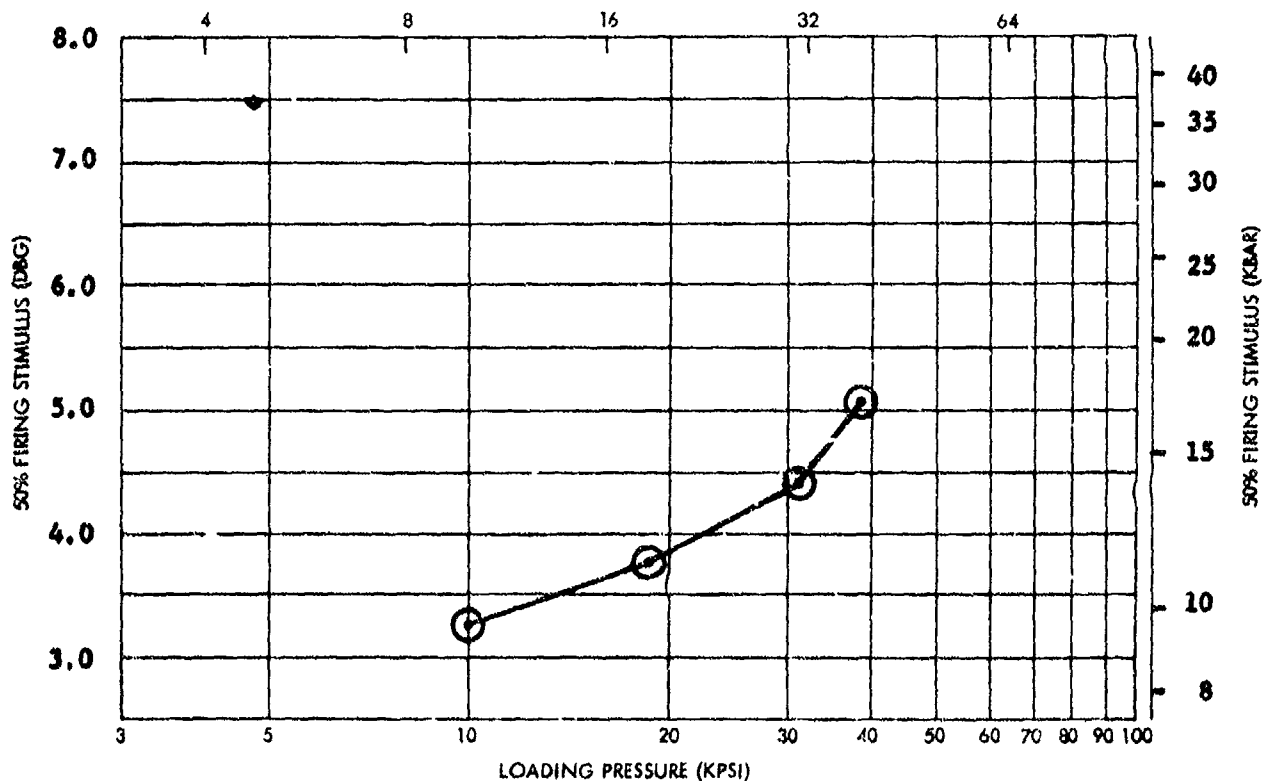


|           |              |           |                |              |
|-----------|--------------|-----------|----------------|--------------|
| EXPLOSIVE | <b>RDX</b>   | X NO.     | <b>189 (1)</b> | Date of Test |
| TMD       | <b>1.802</b> | I. D. NO. | <b>-</b>       | <b>2/60</b>  |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10.0                    | 1.546                         | 0.0035 | 85.8  | 3.250             | 0.0049 | 0.0041         | 43 |         |
| 10.3                    | 1.618                         | 0.0054 | 89.8  | 3.762             | 0.0385 | 0.0160         | 44 |         |
| 31                      | 1.702                         | 0.0084 | 94.5  | 4.413             | 0.0783 | 0.0289         | 46 | (2)     |
| 38.2                    | 1.717                         | 0.0050 | 95.3  | 5.073             | 0.1639 | 0.0555         | 45 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) RDX - Type B, Class B.

(2) Material loaded under vacuum.

SMALL SCALE GAP TEST (SSGT) DATA  
RDX

B5a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX Type B Class B, (JAN SPEC-R-398)

X NO.: 189 ID:                      Z NO.:                      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: cyclotrimethylenetrinitramine (Cyclonite)

DATE RECEIVED: 11/30/54

LOT NO.:

INITIAL QUANTITY: 2000 pounds  
(Cost \$800)

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = 24 cm (AVG.)

s = log units

n =

Remarks



B 5 a 2

4 Sep 1973

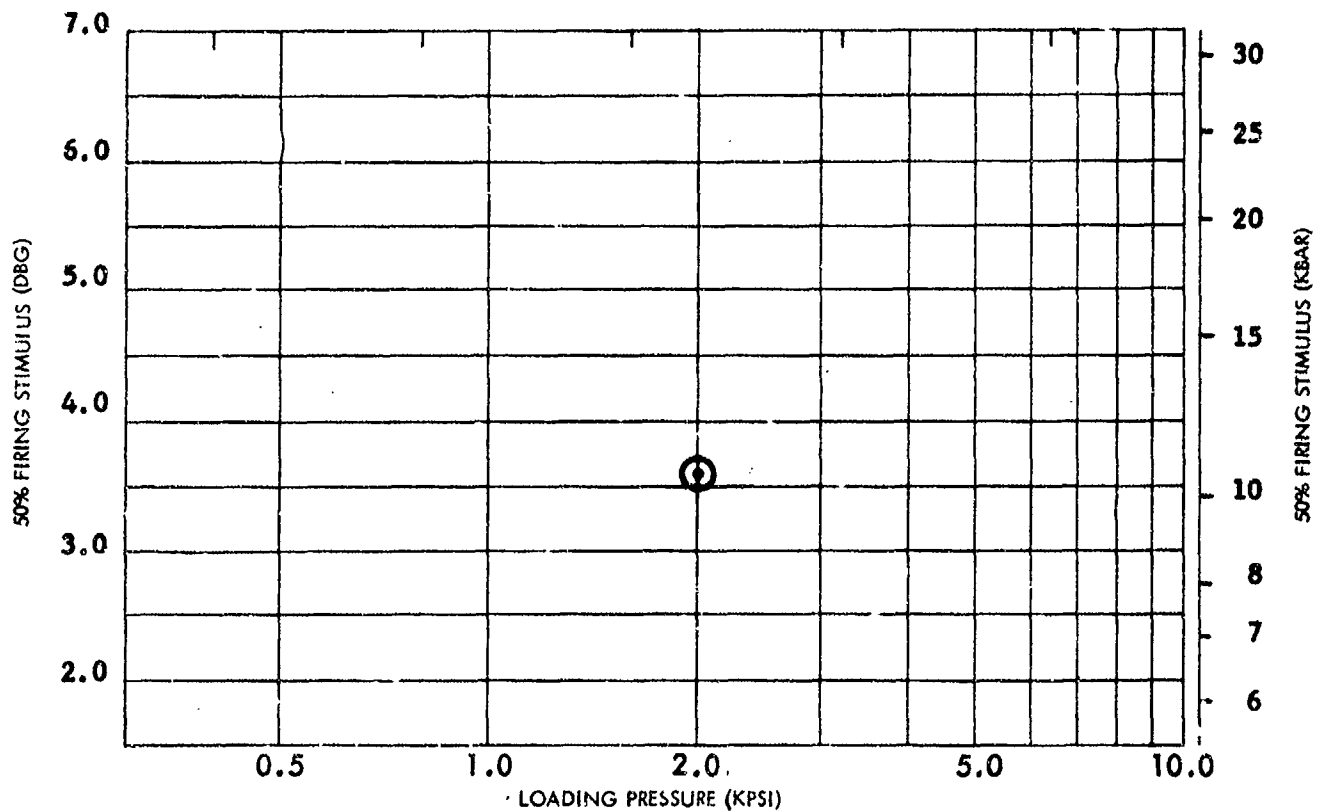
EXPLOSIVE **RDX**  
TMD **1.802**

X NO. **414 (1)**  
I. D. NO. **-**

Date of Test  
**1/63**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |               | % TMD       | SENSITIVITY (DBG) |               |                |           | REMARKS |
|-------------------------------|----------------------------------|---------------|-------------|-------------------|---------------|----------------|-----------|---------|
|                               | AVG.                             | s             |             | AVG.              | g             | s <sub>m</sub> | N         |         |
| <b>2.0</b>                    | <b>1.188</b>                     | <b>0.0162</b> | <b>65.9</b> | <b>3.569</b>      | <b>0.0305</b> | <b>0.0204</b>  | <b>23</b> |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |

**(1) Exploding Bridgewire Grade**



SMALL SCALE GAP TEST (SSGT) DATA  
RDX

B5b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX, EBW Grade

X NO.: 414 ID: Z NO.: 451 SSGT LOAD ORDER NO.:

SOURCE: Lockheed Missile & Space Co., Santa Cruz, CA.  
(NOW 63-0050-C)

CHEMICAL NAME: Cyclotrimethylenetrinitramine (Cyclonite)

DATE RECEIVED: 1/3/63 LOT NO.:

INITIAL QUANTITY: 1/2 pound (WET) BATCH NO.: SCTB 36669-1-1  
Date 1951

MANUFACTURED BY:

Wabash Ordnance Depot  
Wabash, Ill.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

5 = cm

s = log units

n =

Remarks

B 5 b 2

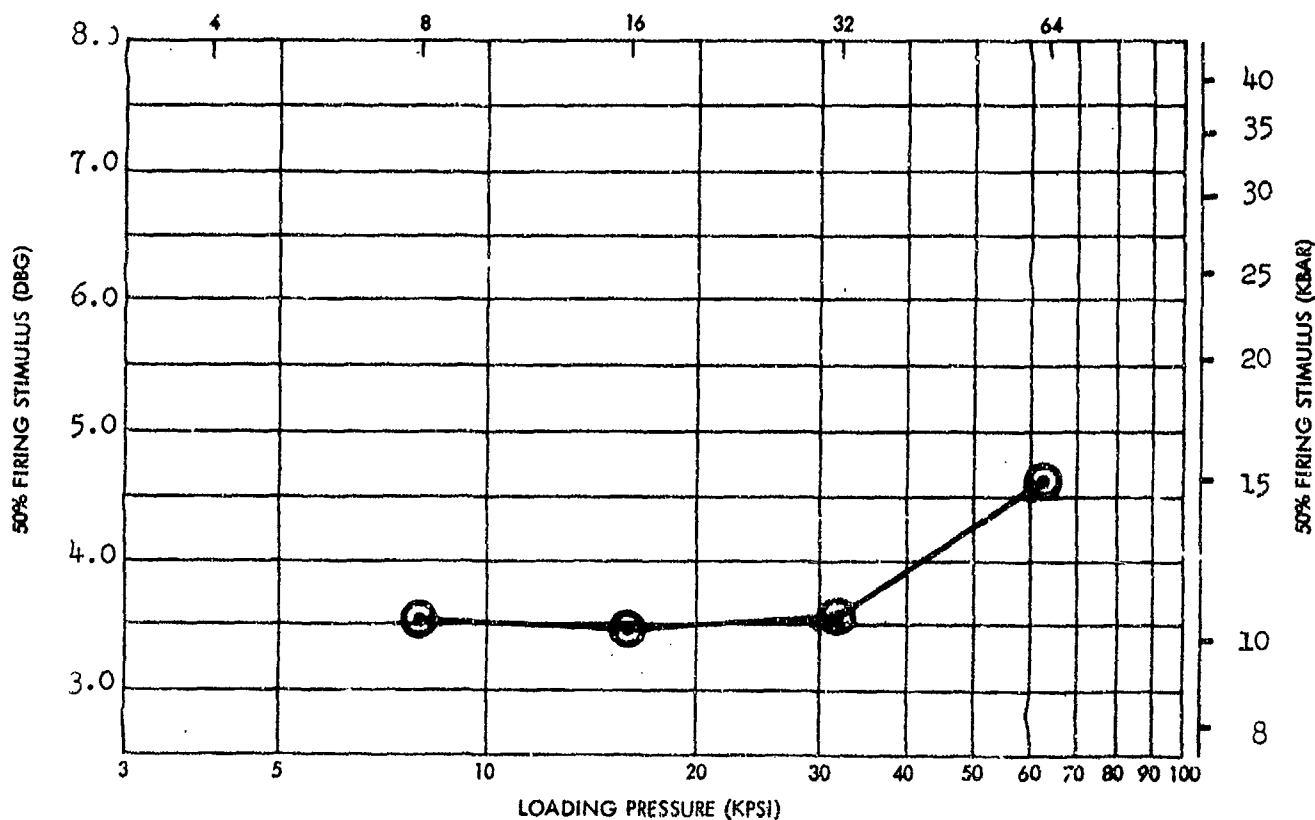
4 Sep 1973

EXPLOSIVE HMX  
TMD 1.903

X NO. \_\_\_\_\_  
I. D. NO. \_\_\_\_\_

Date of Test  
6/61

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |   | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|---|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.517                         | - | 79.7  | 3.526             | 0.0172 | 0.0216         | 20 |         |
| 16                      | 1.627                         | - | 85.5  | 3.475             | 0.0548 | 0.0328         | 20 |         |
| 32                      | 1.718                         | - | 90.3  | 3.508             | 0.0102 | 0.0097         | 20 |         |
| 64                      | 1.814                         | - | 95.3  | 4.644             | 0.1546 | 0.1023         | 20 |         |
|                         |                               |   |       |                   |        |                |    |         |
|                         |                               |   |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
HMX

B6a1

4 Sep 1973

CHEMICAL DATA

EXPLOSIVE NAME:                     HMX                    

X NO.:                      ID:                      Z NO.:                      SSCT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: Cyclotetramethylenetetranitramine

DATE RECEIVED:                      LOT NO.:

INITIAL QUANTITY:                      BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

5 =                      cm

s =                      log units

n =

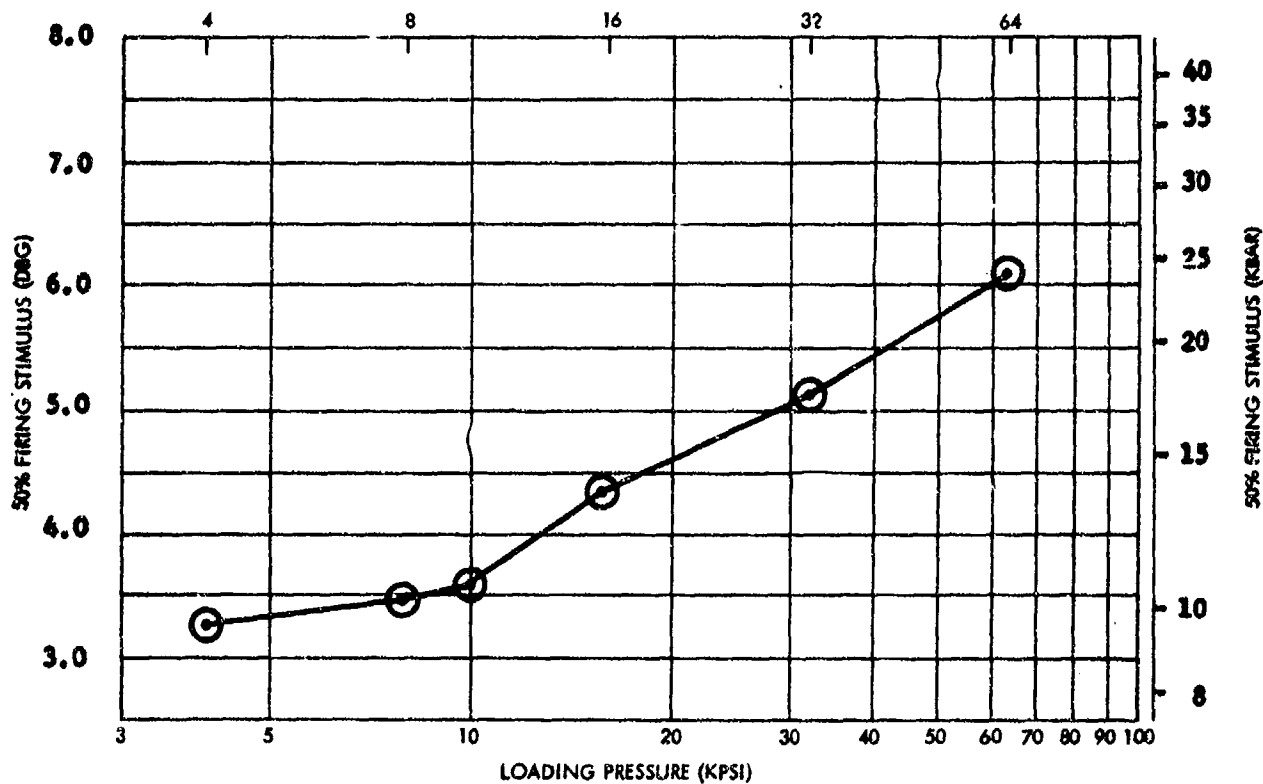
Remarks

No information available

|           |            |           |     |              |
|-----------|------------|-----------|-----|--------------|
| EXPLOSIVE | TETRYL (1) | X NO.     | 102 | Date of Test |
| TMD       | 1.73       | I. D. NO. | -   | 6/61         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD        | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|--------------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |              | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.434                         | -      | 82.9         | 3.267             | 0.0175 | 0.0243         | 20 |         |
| 8                       | 1.535                         | -      | 88.7         | 3.478             | 0.0477 | 0.0297         | 20 |         |
| 10                      | 1.527                         | 0.0096 | 88.3         | 3.586             | 0.1307 | 0.0434         | 46 | (2)     |
| 16                      | 1.623                         | -      | 93.8         | 4.360             | 0.1631 | 0.0901         | 20 |         |
| 32                      | 1.687                         | -      | 97.5         | 5.133             | 0.0242 | 0.0205         | 20 |         |
| 64                      | 1.732                         | -      | (3)<br>100.1 | 6.093             | 0.0242 | 0.0202         | 20 |         |

- (1) TETRYL, YELLOW  
 (2) DATE OF TEST; 6/60  
 (3) EXPERIMENTAL ERROR



SMALL SCALE GAP TEST (SSGT) DATA  
 TETRYL (YELLOW)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: Tetryl (Yellow)

X NO.: 102

ID:

Z NO.:

SSGT LOAD ORDER NO.:

SOURCE: NAD Crane, Indiana

CHEMICAL NAME:

DATE RECEIVED: 4/5/49

LOT NO.:

INITIAL QUANTITY: 2000 pound  
Expended Feb 62

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

Sieve Analysis  
(100 grams, for 1 hour)\*

|                   |       |   |
|-------------------|-------|---|
| Held on 12        | 0     | % |
| Through 12 on 16  | 0.32  | % |
| Through 16 on 60  | 97.87 | % |
| Through 60 on 100 | 1.17  | % |
| on Pan            | 0.64  | % |

21 Feb 1957

\*Assumed that this notation  
indicates 1 hour sieve time.





EXPLOSIVE TETRYL (GRAPHITED)  
TMD 1.73 (1)

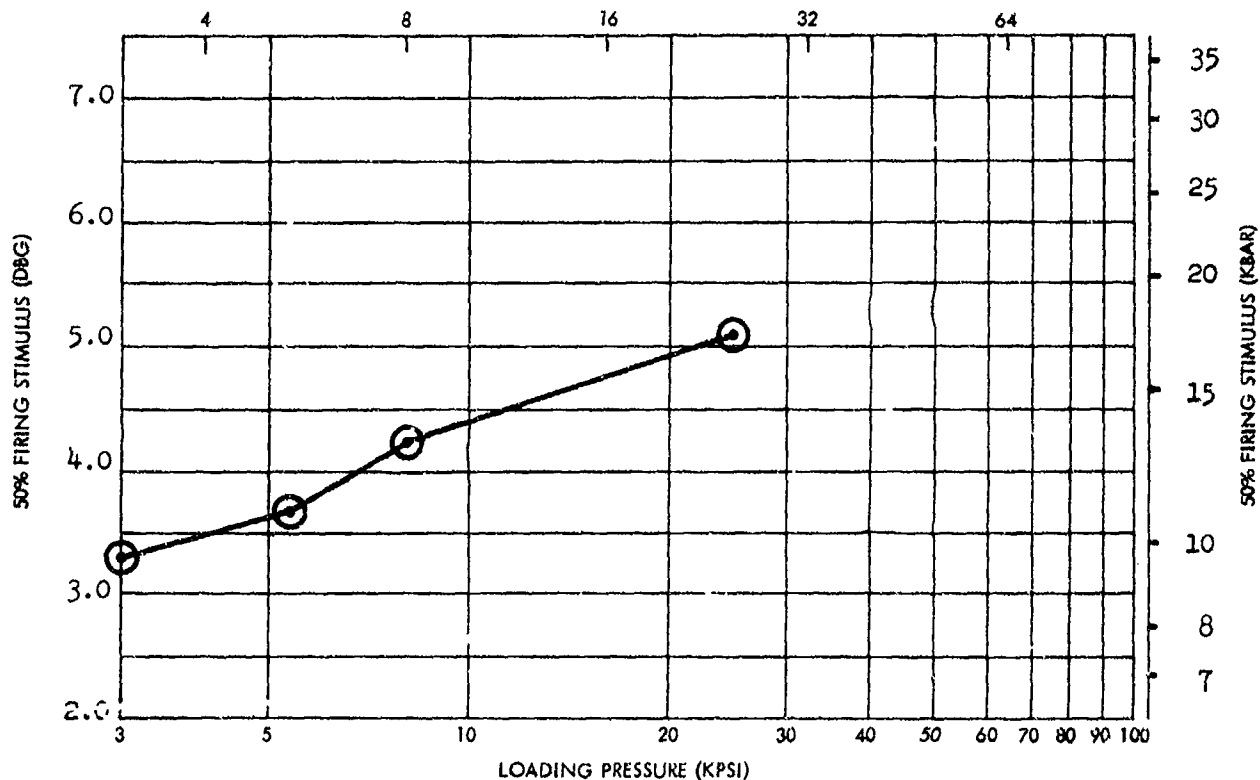
X NO. 460  
I. D. NO. --

Date of Test  
6/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 3                       | 1.423                         | 0.0073 | 82.3  | 3.291             | 0.0369 | 0.0220         | 28 |         |
| 5.3                     | 1.503                         | 0.0032 | 86.9  | 3.684             | 0.0282 | 0.0209         | 28 |         |
| 8                       | 1.549                         | -      | 89.5  | 4.239             | 0.0098 | 0.0337         | 20 | (2)     |
| 24                      | 1.660                         | 0.0015 | 96.0  | 5.081             | 0.0392 | 0.0229         | 28 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) The TMD of pure tetryl is used since Graphited Tetryl can contain either Calcium Stearate ( $\rho = 1.040$ ) or Graphite ( $\rho = 2.25$ ), or both in any combination, up to a total of 2% by weight.

(2) Date of Test - 2/65



SMALL SCALE GAP TEST (SSGT) DATA  
TETRYL (GRAPHITED)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TETRYL (Graphited)\*

X NO.: 460

ID:

Z NO.:

SSGT LOAD ORDER NO.: 1069

SOURCE: NOP Macon, Reqn 60921-4-000103

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.: R/O ARE = 00045-N2

INITIAL QUANTITY: 200 pounds

BATCH NO.:

MANUFACTURED BY:

Naval Ordnance Plant  
Macon, Georgia

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

\* Composition: Tetryl/Graphite (2% Max.)



C 2 a 2

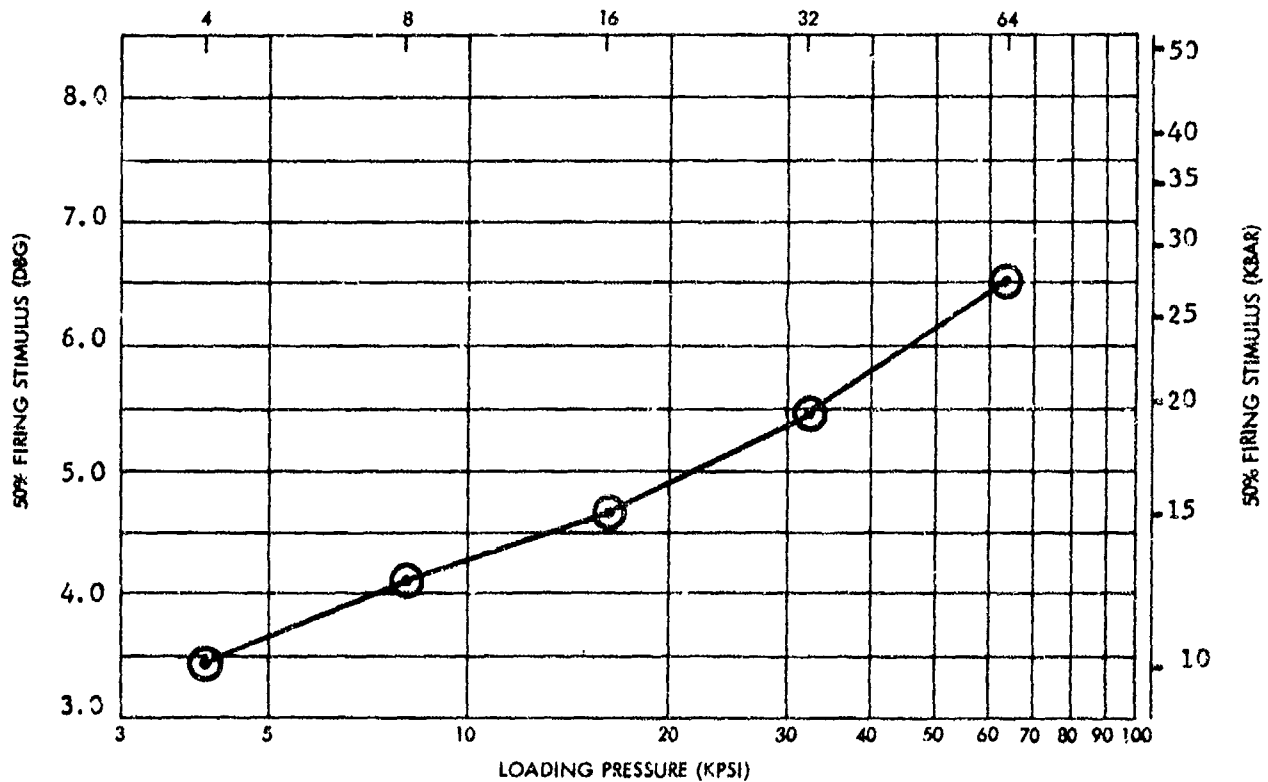
4 Sep 1973

|           |                    |           |     |
|-----------|--------------------|-----------|-----|
| EXPLOSIVE | TETRYL (GRAPHITED) | X NO.     | 450 |
| TMD       | 1.73 (1)           | I. D. NO. | 374 |

Date of Test  
6/68

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.445                         | 0.0042 | 83.5  | 3.450             | 0.0352 | 0.0220         | 23 |         |
| 8                       | 1.541                         | 0.0057 | 82.1  | 4.103             | 0.0123 | 0.0132         | 23 |         |
| 16                      | 1.630                         | 0.0038 | 94.2  | 4.659             | 0.0400 | 0.0237         | 23 |         |
| 32                      | 1.696                         | 0.0022 | 98.0  | 5.465             | 0.0489 | 0.0297         | 23 |         |
| 64                      | 1.737                         | 0.0022 | 100.4 | 6.503             | 0.0748 | 0.0404         | 23 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) The TMD of pure tetryl is used since Graphited Tetryl can contain either Calcium Stearate ( $\rho = 1.040$ ) or Graphite ( $\rho = 2.25$ ), or both in any combination, up to a total of 2% by weight.



SMALL SCALE GAP TEST (SSGT) DATA

TETRYL (GRAPHITED)

C2b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TETRYL (Graphited)\*

X NO.: 460 ID: 374 Z NO.: SSGT LOAD ORDER NO.: 1236

SOURCE: NOP Macon, Regn 60921-4-000103

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.: R/O ARE = 00045-N2

INITIAL QUANTITY: 200 pounds

BATCH NO.:

MANUFACTURED BY:

Naval Ordnance Plant  
Macon, Georgia

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

\* Composition: Tetryl/Graphite (2% Max.)



2212

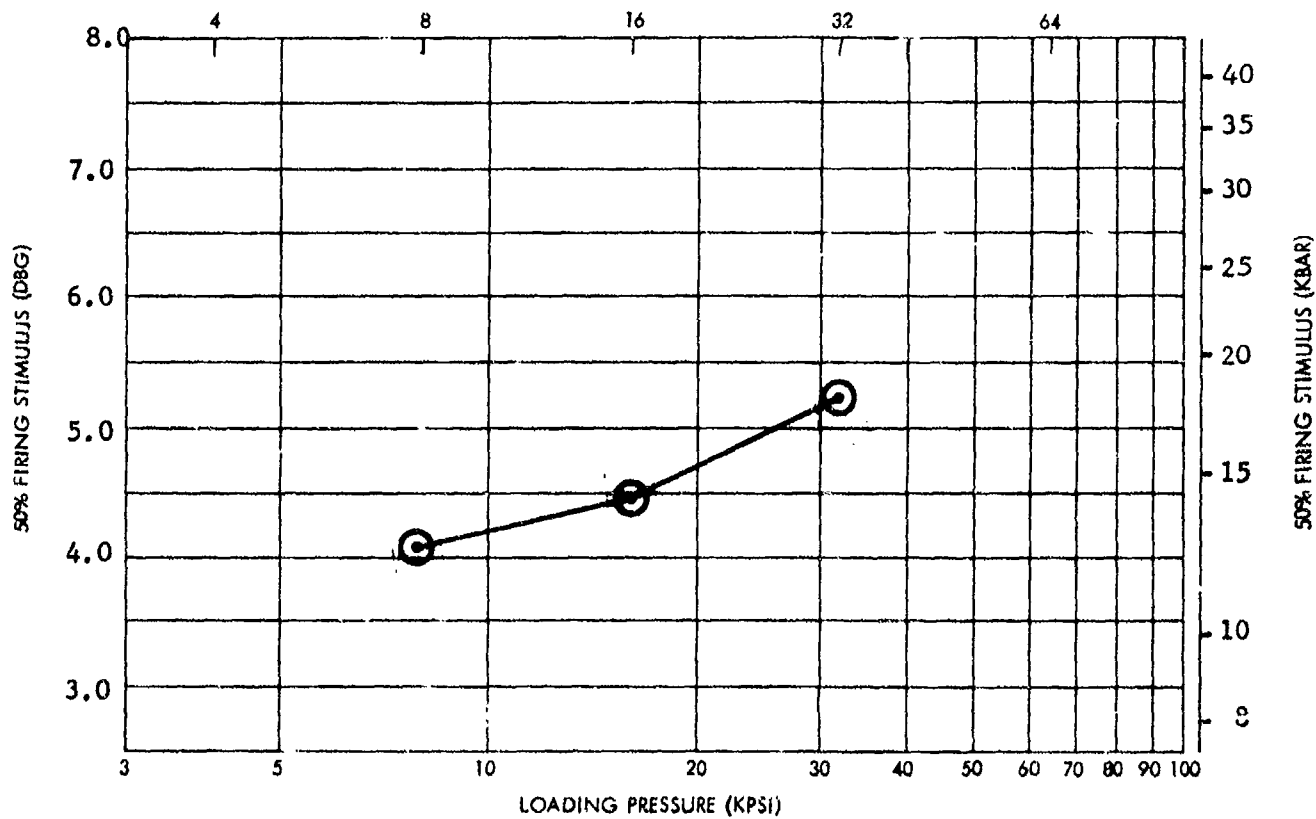
4 Sep 1973

|           |                    |           |     |
|-----------|--------------------|-----------|-----|
| EXPLOSIVE | TETRYL (GRAPHITED) | X NO.     | 672 |
| TMD       | 1.738              | I. D. NO. | 896 |

Date of Test  
4/70

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.545                         | 0.0030 | 88.9  | 4.112             | 0.0037 | 0.0047         | 20 |         |
| 16                      | 1.623                         | 0.0023 | 93.4  | 4.487             | -      | -              | 20 | (1)     |
| 32                      | 1.695                         | 0.0021 | 97.5  | 5.243             | -      | -              | 20 | (1)     |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone.



SMALL SCALE GAP TEST (SSGT) DATA  
TETRYL (GRAPHITED)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TETRYL (Graphited)\*

X NO.: 672 ID: 896 Z NO.: SSGT LOAD ORDER NO.: 1266

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 7/16/68

LOT NO.: RN601

INITIAL QUANTITY: 1200 grams

BATCH NO.:

MANUFACTURED BY:

NOL: 233 Division  
Bldg 318

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

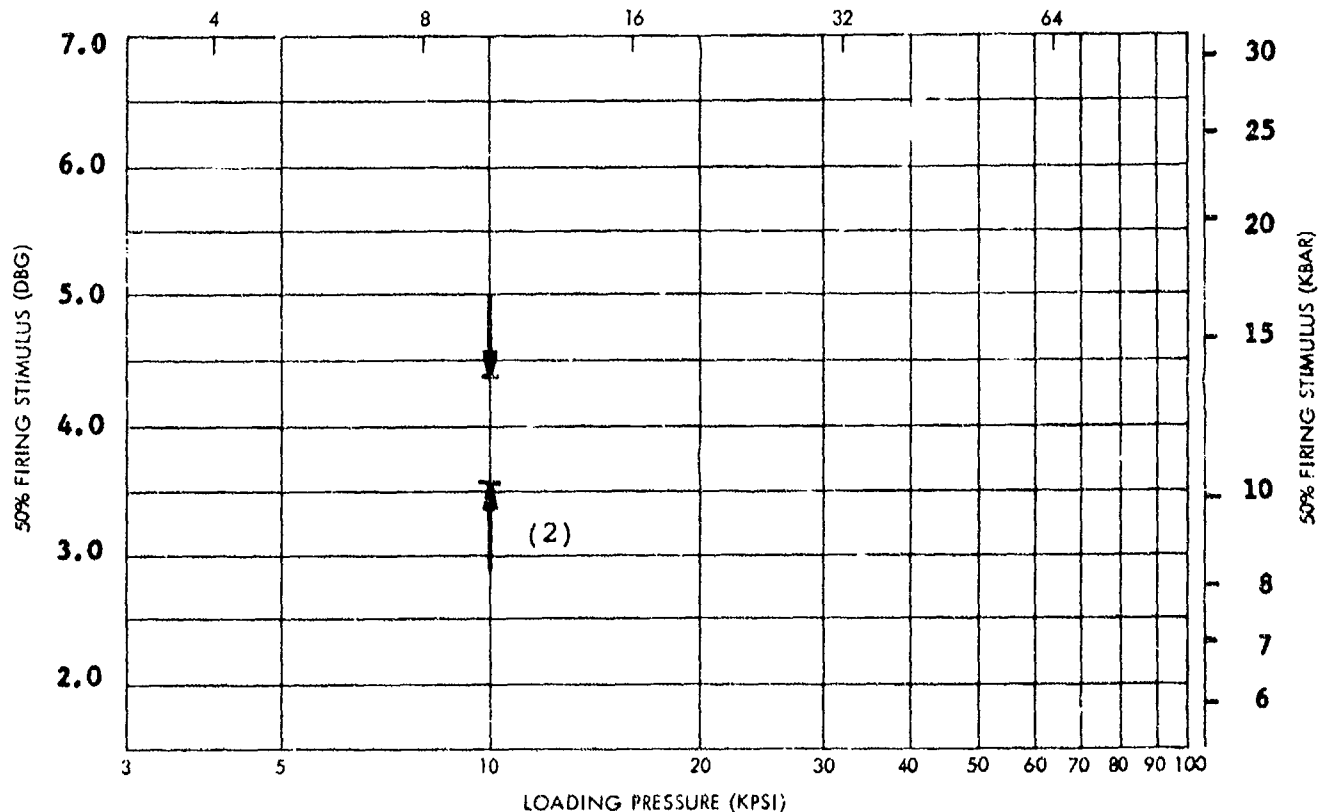
\*Made by adding 2% of N-11 Graphite  
to yellow tetryl X436

|           |       |           |             |              |
|-----------|-------|-----------|-------------|--------------|
| EXPLOSIVE | CH-6  | X NO.     | See remarks | Date of Test |
| TMD       | 1.774 | I. D. NO. | -           | 6/60         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS       |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |               |
| 10                      | 1.619                         | 0.0069 | 91.3  | 3.573             | 0.0220 | 0.0114         | 46 | X No. 255; #1 |
| 10                      | 1.619                         | 0.0079 | 91.3  | 3.529             | 0.1459 | 0.0478         | 46 | X No. 255; #2 |
| 10                      | 1.641                         | 0.0045 | 92.5  | 4.362             | 0.0538 | 0.0213         | 46 | X No. 267     |
| 10                      | 1.605                         | 0.0128 | 90.5  | 4.092             | 0.0422 | 0.0167         | 46 | X No. 303     |
| 10                      | 1.598                         | 0.0067 | 90.1  | 3.644             | 0.0889 | 0.0305         | 46 | X No. 304     |
| 10                      | 1.619                         | 0.0055 | 91.2  | 3.676             | 0.1174 | 0.0403         | 46 | X No. 305 (1) |
| 10                      | 1.597                         | 0.0061 | 90.0  | 4.011             | 0.0348 | 0.0150         | 46 | X No. 307     |
| 10                      | 1.598                         | 0.0075 | 90.1  | 3.572             | 0.0175 | 0.0120         | 46 | X No. 309     |

(1) Date of Test - 10/60

(2) Range indicted gives minimum and maximum sensitivity value observed from above table.



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

CHEMICAL DATA - Explosive: CH-6\*

Manufacturers: Holston Ordnance Works (Kingsport, Tenn.)

| X Number | Date Recd. | Initial Amount | Lot Number                                      | Batch    | Remarks   |
|----------|------------|----------------|---|----------|---|
| 255      | 6 Jul 56   | 210 pounds     | Pilot Prod lot                                  |          | FROM NOP Macon, Ga.   |
| 267      | 19 Apr 57  | 920 pounds     | HOL-SR-8-57                                     | 86-88-1  |   |
| 303      |            |                |   |          |   |
| 304      | 24 Nov 59  | 35 pounds      |   | 86-207-2 | Mfg. Jan 59. FROM NAD Crane, Ind., Via NAD Seal Beach, Calif. |
| 305      | 21 Nov 59  | 35 pounds      |   |          |   |
| 307      | 17 Dec 59  | 250 grams      | HOL-SR-200-58<br>HOL-SR-201-58<br>HOL-SR-202-58 |          | Composite sample from NAD Crane, Ind.                         |
| 309      | 17 Dec 59  | 250 grams      |   |          | Replicate sampling of same 3 lots as X307.                    |

Impact Sensitivity

|      |                 |
|------|-----------------|
| X255 | 42 cm, s = 0.12 |
| X267 | 29 cm, s = 0.07 |
| X303 | 50 cm, s = 0.14 |
| X304 | 30 cm, s = 0.12 |

\*Composition: RDX-----97.5%  
Calcium Stearate----- 1.5%  
Graphite----- 0.5%  
Polyisobutylene----- 0.5%

4 Sep 1973

CLAL

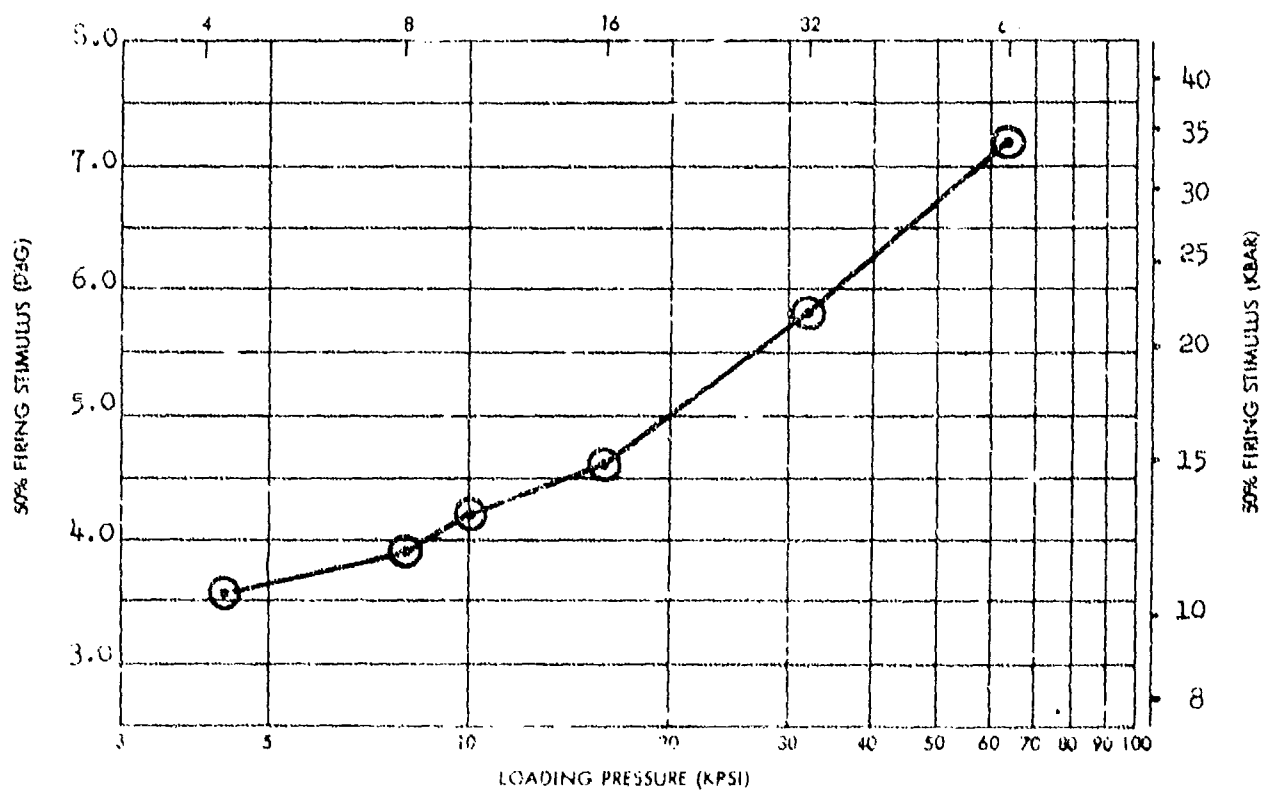


|           |       |           |     |
|-----------|-------|-----------|-----|
| EXPLOSIVE | CH-6  | X NO.     | 329 |
| TMD       | 1.774 | I. D. NO. | -   |

Date of Test  
12/64

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 4                       | 1.489                         | 0.0114 | 83.9  | 3.503             | 0.0050 | 0.0039         | 18 |         |
| 8                       | 1.567                         | 0.0056 | 88.3  | 3.876             | 0.0010 | 0.0017         | 18 |         |
| 10                      | 1.623                         | 0.0028 | 91.4  | 4.229             | 0.0384 | 0.0265         | 18 |         |
| 16                      | 1.665                         | 0.0069 | 93.9  | 4.620             | 0.0052 | 0.0047         | 18 |         |
| 32                      | 1.734                         | 0.0015 | 97.7  | 5.812             | 0.0612 | 0.0377         | 18 |         |
| 64                      | (1)<br>1.777                  | 0.0026 | 100.2 | 7.207             | 0.0413 | 0.0283         | 18 |         |

(1) Experimental error



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

C3b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: CH-6 \*

X NO.: 329 ID: Z NO.: SSGT LOAD ORDER NO.: 997

SOURCE: NAD Crane, Indiana

CHEMICAL NAME:

DATE RECEIVED: 1/5/61

LOT NO.: HOL-SR-200-58

INITIAL QUANTITY: 630 pounds

BATCH NO.: \*\*

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

s = cm

s = log units

n =

Remarks

\*For composition see \* C3a2

| ** Box | Batch     |
|--------|-----------|
| 1 & 2  | 86-207-4B |
| 3      | 86-207-5  |
| 4      | 86-207-3  |



C 3 b 2

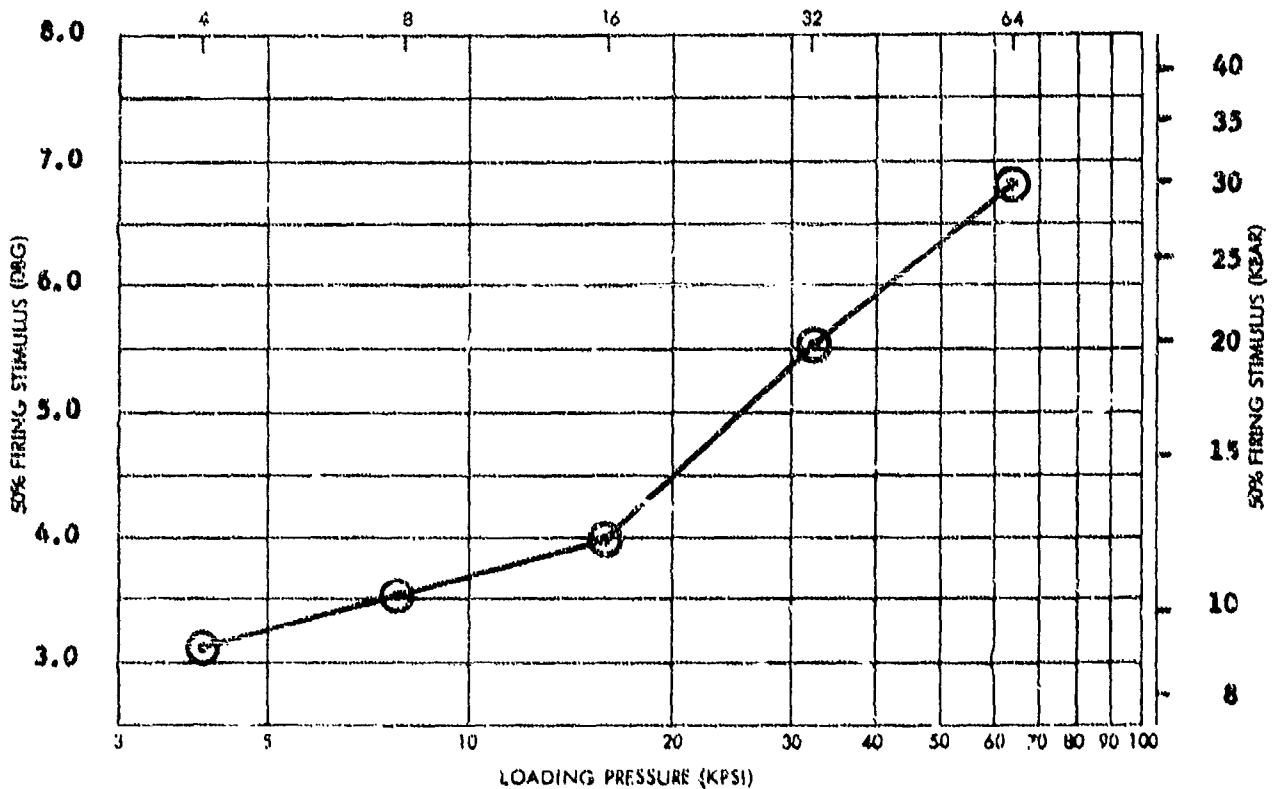
4 Sep 1973

|           |       |           |     |
|-----------|-------|-----------|-----|
| EXPLOSIVE | CH-6  | X NO.     | 344 |
| TMD       | 1.774 | I. D. NO. | -   |

Date of Test  
1/64

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |   | % TMD | SENSITIVITY (D&G) (1) |   |                |    | REMARKS |
|-------------------------|-------------------------------|---|-------|-----------------------|---|----------------|----|---------|
|                         | AVG.                          | s |       | AVG.                  | u | s <sub>m</sub> | N  |         |
| 4                       | 1.500                         | - | 84.6  | 3.131                 | - | -              | 18 |         |
| 8                       | 1.573                         | - | 88.7  | 3.541                 | - | -              | 18 |         |
| 16                      | 1.665                         | - | 93.9  | 3.984                 | - | -              | 18 |         |
| 32                      | 1.726                         | - | 97.3  | 5.344                 | - | -              | 18 |         |
| 64                      | 1.767                         | - | 99.6  | 6.838                 | - | -              | 18 |         |

(1) Sensitivity parameters computed using a Gaussian distribution and using the Bruceton Analytical Method.



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

C8c1

Change 1  
20 Dec 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: CH-6 \*

X NO.: 344 ID:

Z NO.:

SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

# = cm

s = log units

n =

Remarks

\*For composition see \* C3a2

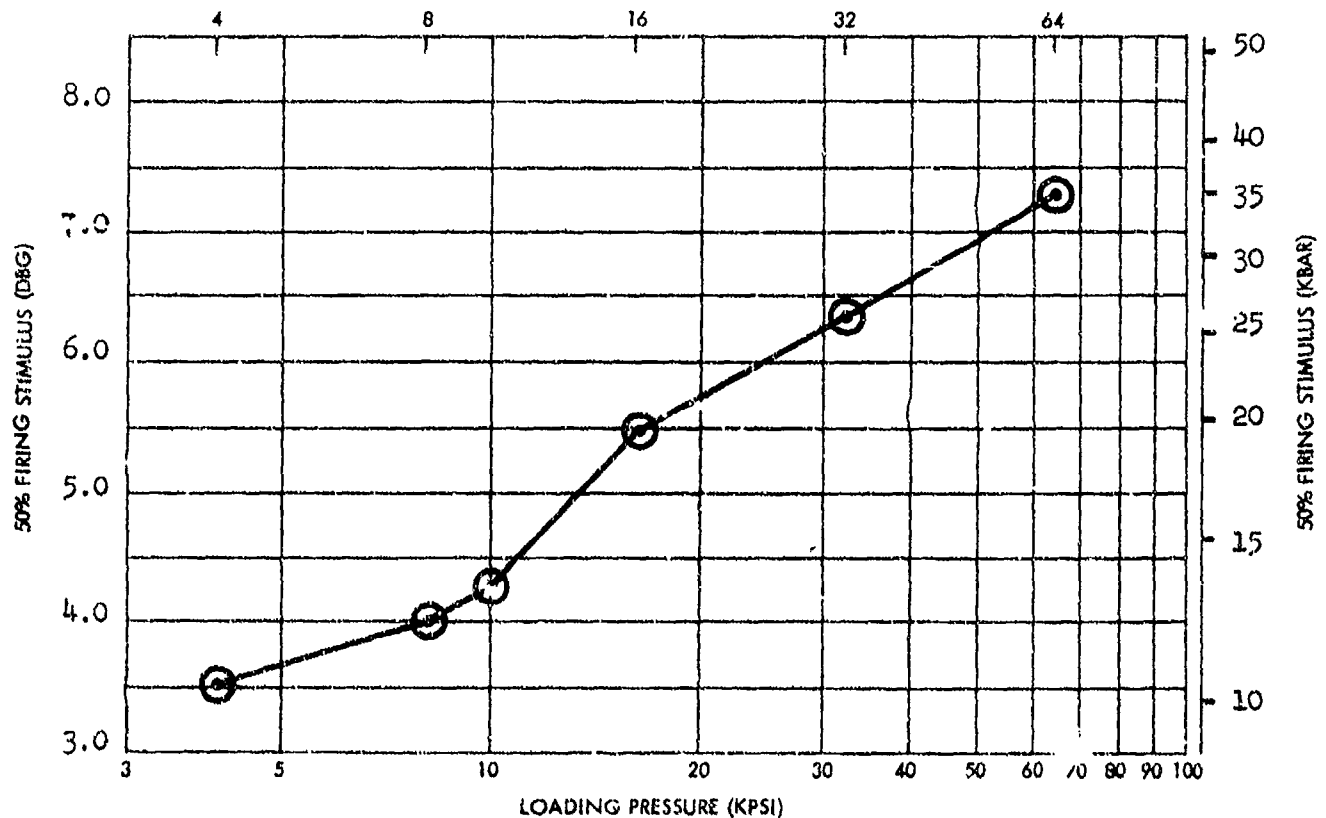
C 3 c 2

Chen,  
20 Dec 1973

|           |       |           |     |
|-----------|-------|-----------|-----|
| EXPLOSIVE | CH-6  | X NO.     | 439 |
| TMD       | 1.774 | I. D. NO. | -   |

Date of Test  
1/64

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.551                         | 0.0043 | 87.4  | 3.532             | 0.0415 | 0.0276         | 18 |         |
| 8                       | 1.618                         | 0.0045 | 91.2  | 3.993             | 0.0037 | 0.0035         | 18 |         |
| 10                      | 1.657                         | -      | 93.4  | 4.250             | 0.0662 | 0.0532         | 18 |         |
| 16                      | 1.704                         | 0.0030 | 96.1  | 5.465             | 0.0353 | 0.0264         | 18 |         |
| 32                      | 1.749                         | 0.0016 | 98.6  | 6.355             | 0.0210 | 0.0163         | 18 |         |
| 64                      | 1.770                         | 0.0038 | 99.8  | 7.297             | 0.0307 | 0.0233         | 18 |         |



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

C3d1

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: CH-6\*

X NO.: 439 ID: Z NO.: SSGT LOAD ORDER NO.: 933

SOURCE: NOP Macon, Georgia

CHEMICAL NAME:

DATE RECEIVED: 10/15/63

LOT NO.: 109-L

INITIAL QUANTITY: 2 pounds

BATCH NO.:

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

3 = cm

s = log units

n =

Remarks

\* For composition see \* C3a2

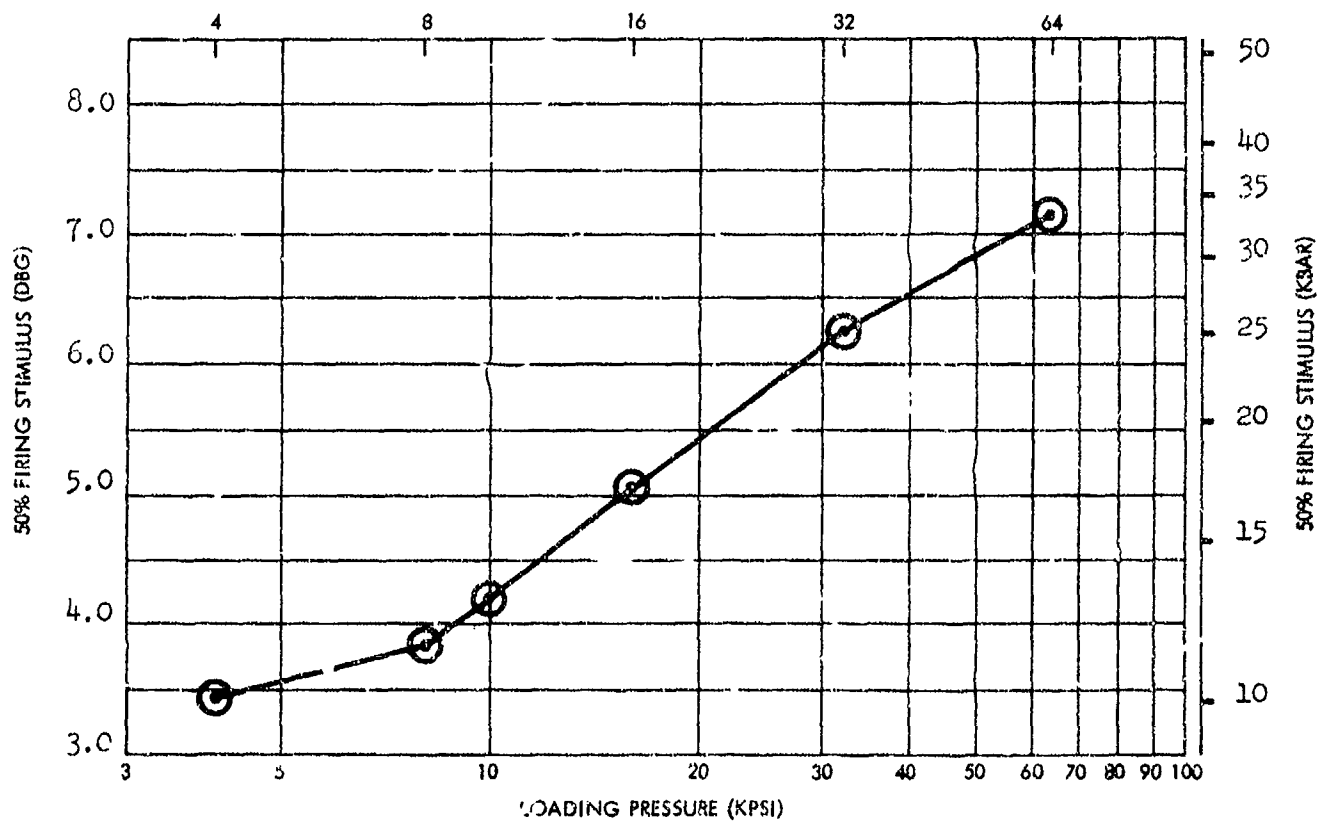
C 3 a 2

4 Sep 1973

|           |       |           |     |
|-----------|-------|-----------|-----|
| EXPLOSIVE | CH-6  | X NO.     | 440 |
| TMD       | 1.774 | I. D. NO. | -   |

Date of Test  
1/64

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.541                         | 0.0077 | 86.9  | 3.444             | 0.2384 | 0.0281         | 18 |         |
| 8                       | 1.603                         | 0.0057 | 90.4  | 3.853             | 0.0744 | 0.0437         | 18 |         |
| 10                      | 1.648                         | -      | 92.9  | 4.205             | 0.0511 | 0.0359         | 18 |         |
| 16                      | 1.682                         | 0.0028 | 94.8  | 5.076             | 0.0547 | 0.0337         | 18 |         |
| 32                      | 1.741                         | 0.0022 | 98.1  | 6.243             | 0.0328 | 0.0240         | 18 |         |
| 64                      | 1.772                         | 0.0020 | 99.9  | 7.184             | 0.0349 | 0.0275         | 18 |         |



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

03e1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: CH-6\*

X NO.: 440 ID: Z NO.: SSGT LOAD ORDER NO.: 934

SOURCE: NOP, Macon, Georgia

CHEMICAL NAME:

DATE RECEIVED: 10/15/63

LOT NO.: 109-N

INITIAL QUANTITY: 2 pounds

BATCH NO.:

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

5 = cm

s = log units

n =

Remarks

\*For composition see \* C3a2

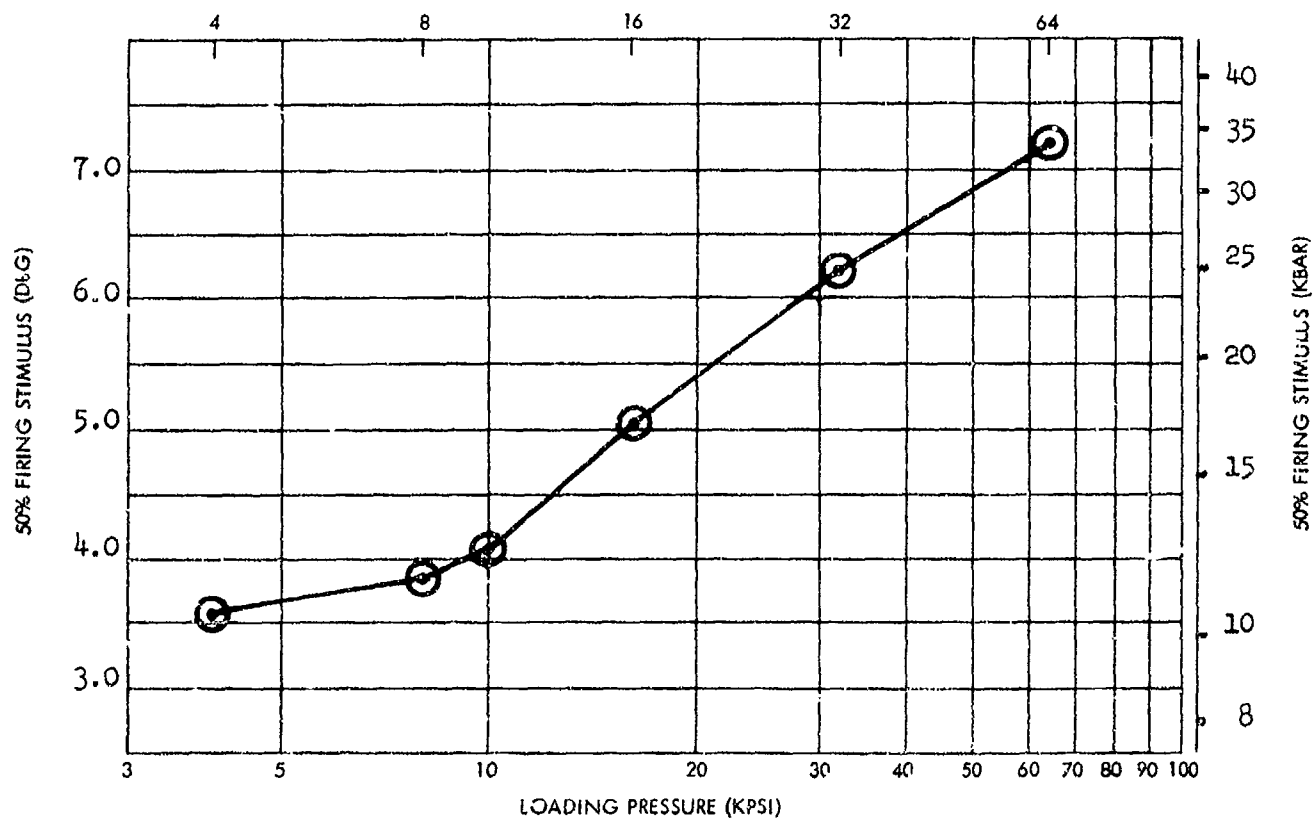


EXPLOSIVE CH-6  
TMD 1.774

X NO. 447  
I. D. NO. -

Date of Test  
1/64

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.537                         | 0.0041 | 86.6  | 3.580             | 0.0932 | 0.0653         | 18 |         |
| 8                       | 1.603                         | 0.0045 | 90.3  | 3.833             | 0.0737 | 0.0446         | 18 |         |
| 10                      | 1.645                         | 0.0035 | 92.7  | 4.089             | 0.2291 | 0.2656         | 18 |         |
| 16                      | 1.681                         | 0.0021 | 94.8  | 5.045             | 0.0713 | 0.0500         | 18 |         |
| 32                      | 1.738                         | 0.0017 | 98.0  | 6.218             | 0.0187 | 0.0245         | 18 |         |
| 64                      | 1.767                         | 0.0020 | 99.6  | 7.202             | 0.0507 | 0.0339         | 18 |         |



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: CH-6 \*

X NO.: 441 ID: Z NO.: SSGT LOAD ORDER NO.: 935

SOURCE: NOP Macon, Georgia

CHEMICAL NAME:

DATE RECEIVED: 10/15/63 LOT NO.: 109-0

INITIAL QUANTITY: 2 pounds BATCH NO.:

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

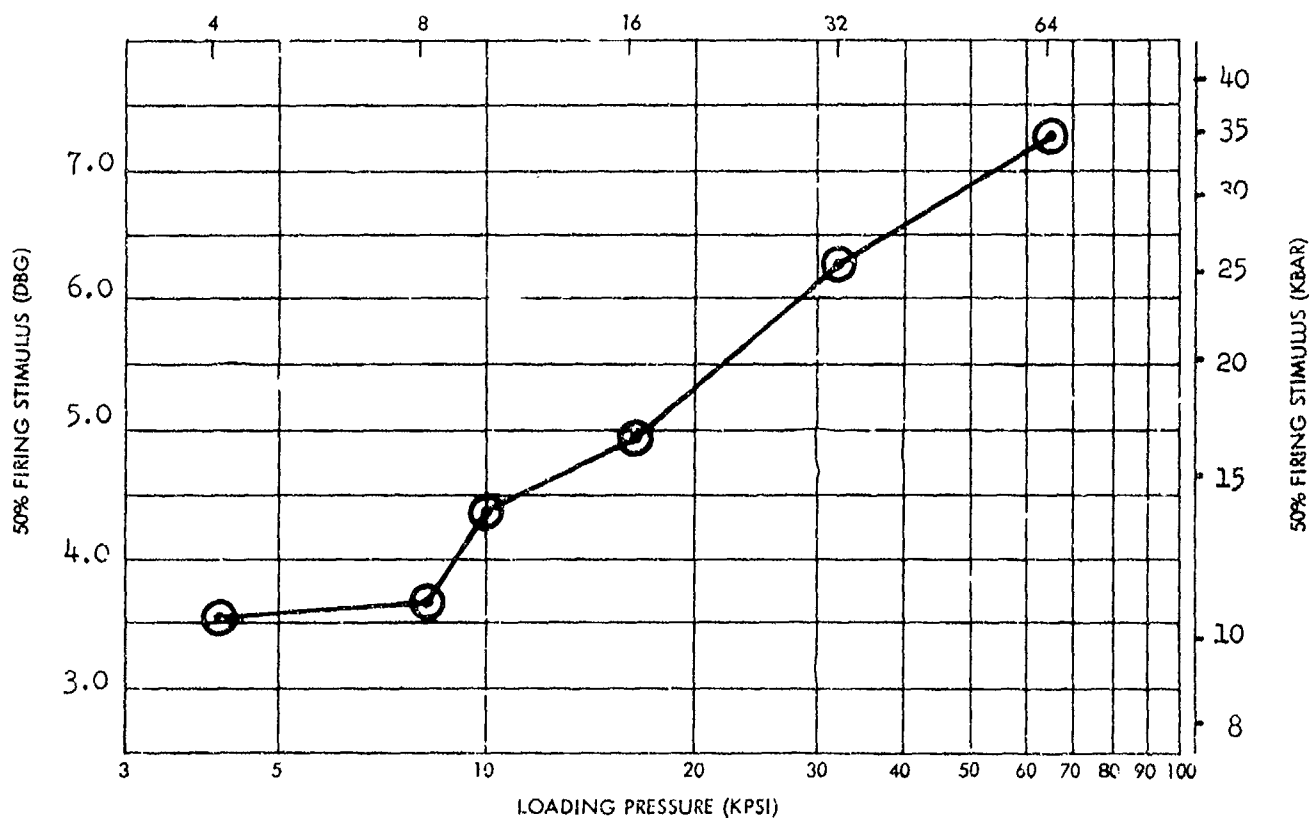
\* For composition see \* C3a2

EXPLOSIVE CH-6  
TMD 1.774

X NO. 442  
I. D. NO. -

Date of Test  
1/64

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.507                            | 0.0096 | 84.9  | 3.523             | 0.0142 | 0.0150         | 18 |         |
| 8                             | 1.579                            | 0.0029 | 89.0  | 3.627             | 0.0010 | 0.0018         | 18 |         |
| 10                            | 1.626                            | 0.0254 | 91.7  | 4.369             | 0.0026 | 0.0031         | 18 |         |
| 16                            | 1.668                            | 0.0031 | 94.0  | 4.915             | 0.1912 | 0.1206         | 18 |         |
| 32                            | 1.738                            | 0.0093 | 98.0  | 6.245             | 0.0618 | 0.0403         | 18 |         |
| 64                            | 1.769                            | 0.0016 | 99.7  | 7.257             | 0.0508 | <b>0.0326</b>  | 18 |         |



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

C3g1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: CH-6 \*

X NO.: 442 ID: Z NO.: SSGT LOAD ORDER NO.: 936

SOURCE: NOP Macon, Georgia

CHEMICAL NAME:

DATE RECEIVED: 10/15/63

LOT NO.: HOL-SR-109-P-62

INITIAL QUANTITY:

BATCH NO.: 485-16

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.  
(1962)

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

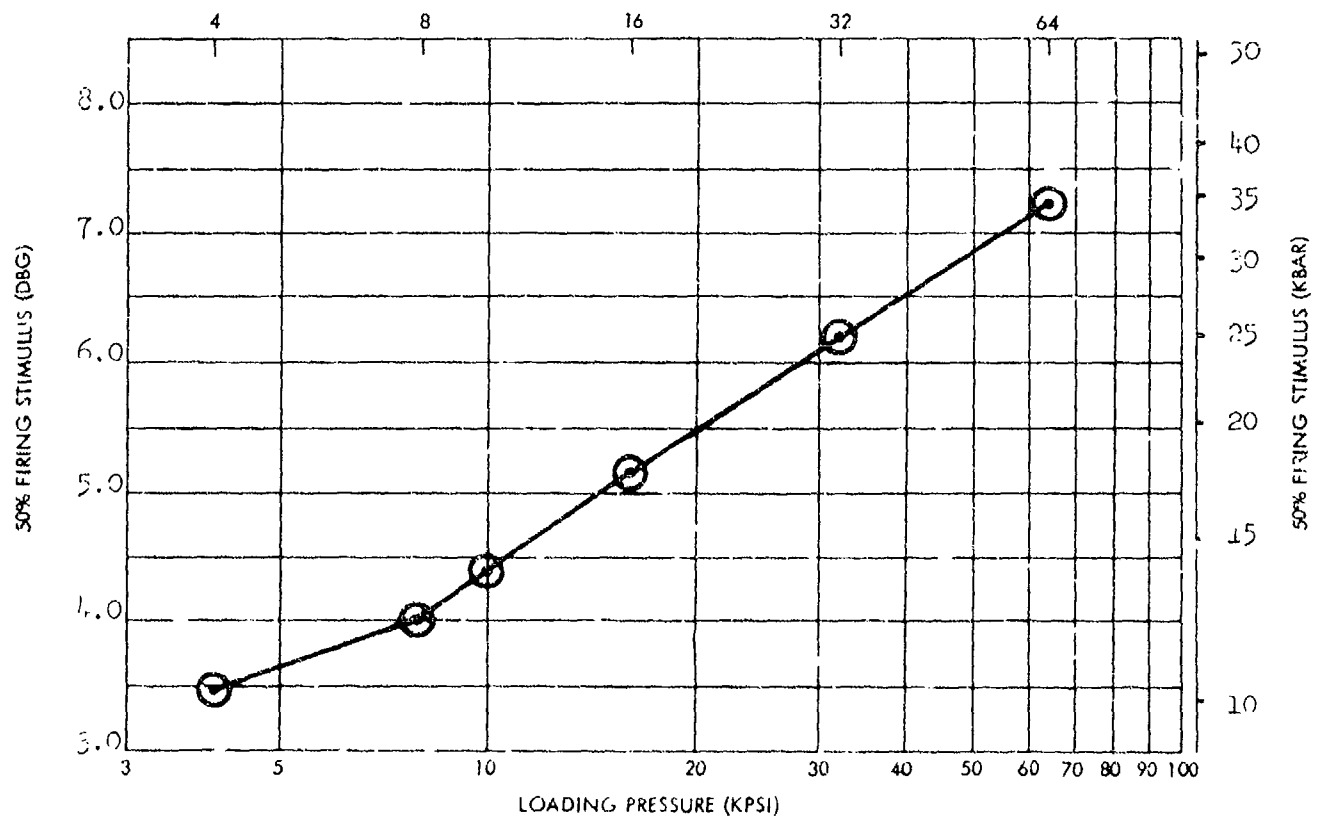
\*For composition see \* C3a2

NOLTR 73-132

|           |       |           |     |
|-----------|-------|-----------|-----|
| EXPLOSIVE | CH-6  | X NO.     | 445 |
| TMD       | 1.774 | I. D. NO. | -   |

Date of Test  
1/64

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.511                         | 0.0106 | 85.2  | 3.481             | 0.0635 | 0.0411         | 18 |         |
| 8                       | 1.602                         | 0.0026 | 90.3  | 4.001             | 0.0554 | 0.0317         | 23 |         |
| 10                      | 1.640                         | 0.0033 | 92.4  | 4.417             | 0.0692 | 0.0410         | 18 |         |
| 16                      | 1.630                         | 0.0022 | 94.7  | 5.157             | 0.0454 | 0.0315         | 12 |         |
| 32                      | 1.740                         | 0.0020 | 98.1  | 6.236             | 0.0283 | 0.0202         | 12 |         |
| 64                      | 1.774                         | 0.0029 | 100.0 | 7.227             | 0.0588 | 0.0353         | 18 |         |



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

C3h1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: CH-6 \*

X NO.: 445 ID: Z NO.: SSGT LOAD ORDER NO.: 958

SOURCE: NOP Macon, Georgia

CHEMICAL NAME:

DATE RECEIVED: 1/6/64

LOT NO.: HOL-SR-109-P-62

INITIAL QUANTITY: 100 pounds

BATCH NO.: 485-16

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.  
(1962)

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

\*For composition see \* C3a2

C 3 h 2

4 Sep 1973

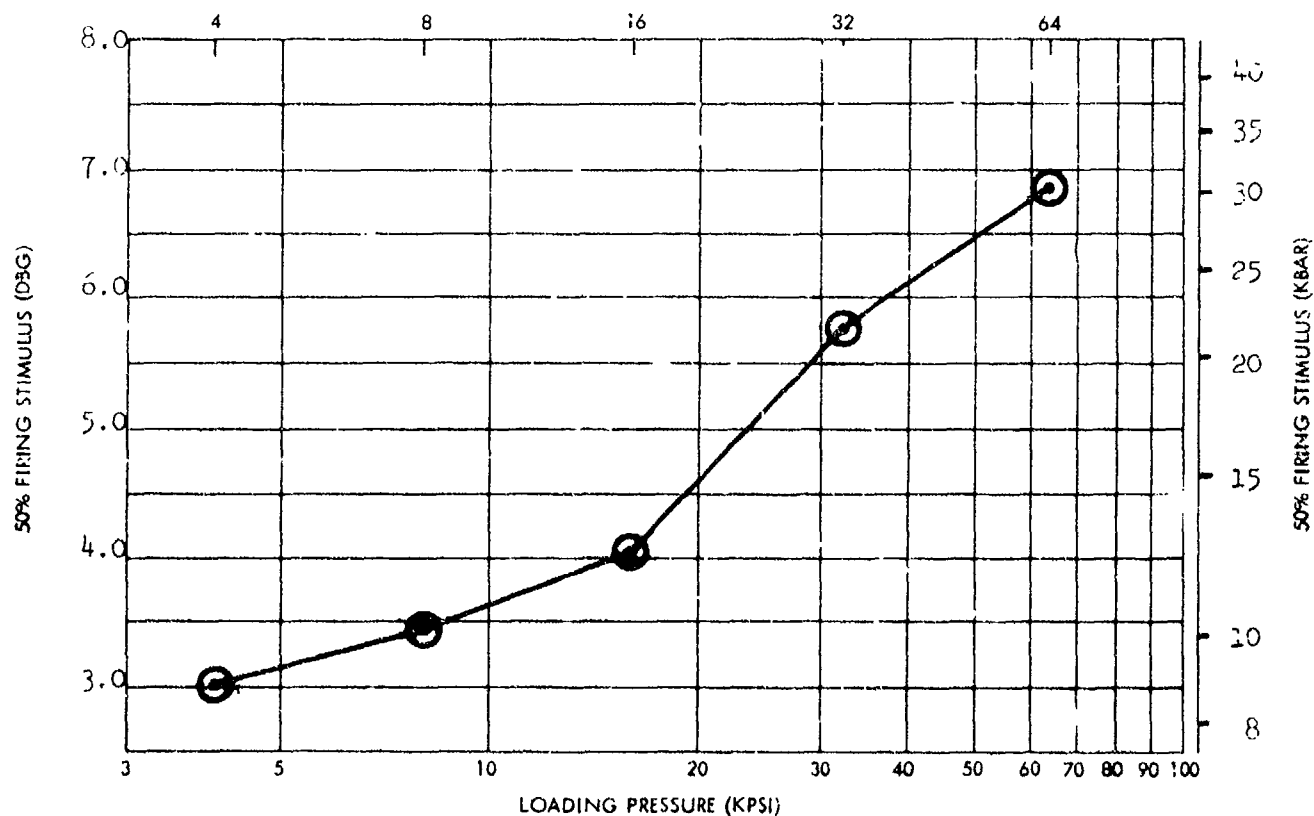
EXPLOSIVE CH-6  
TMD 1.774

X NO. 702  
I. D. NO. 1062

Date of Test  
6/69

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.519                            | 0.0045 | 85.6  | 3.039             | -      | -              | 20 | (1)     |
| 8                             | 1.608                            | 0.0079 | 90.6  | 3.437             | 0.0298 | 0.0226         | 20 |         |
| 16                            | 1.670                            | 0.0023 | 94.1  | 4.069             | 0.0361 | 0.0278         | 20 |         |
| 32                            | 1.734                            | 0.0026 | 97.7  | 5.764             | 0.0578 | 0.0345         | 20 |         |
| 64                            | 1.768                            | 0.0045 | 99.7  | 6.850             | 0.0297 | 0.0212         | 20 |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
CH-6

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: CH-6 \*

X NO.: 702 \*\* ID: 1062 Z NO.: SSGT LOAD ORDER NO.: 1270

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 6/20/69

LOT NO.: HOL-69-24

INITIAL QUANTITY: 200 pounds

BATCH NO.: 5A

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.  
(Feb 1969)

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

\*For composition see \* C3a2

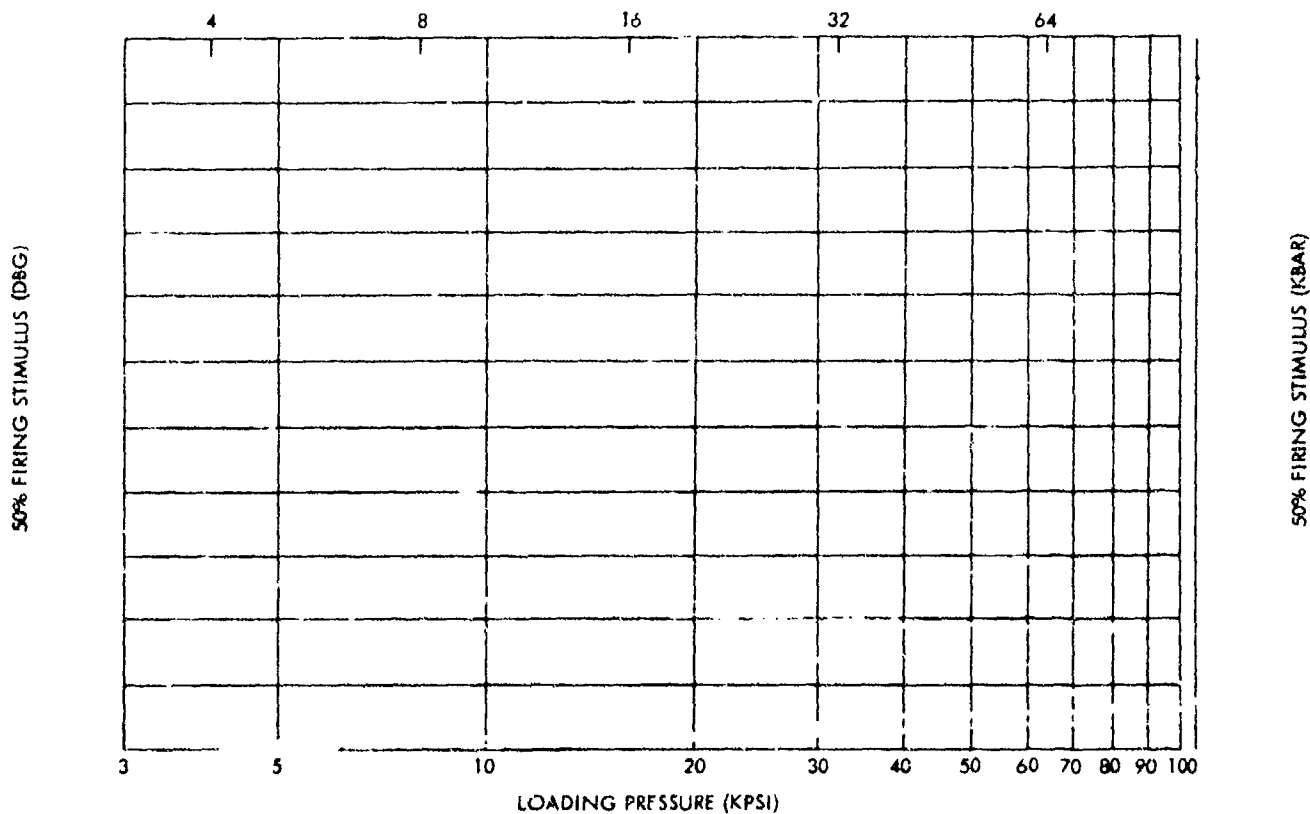
\*\*Identical with X No. 700



NOLTR 73-132

|           |      |           |   |                      |
|-----------|------|-----------|---|----------------------|
| EXPLOSIVE | H-6  | X NO.     | - | Date of Test<br>3/60 |
| TMD       | 1.80 | I. D. NO. | - |                      |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS                  |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|--------------------------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |                          |
| -                       | 1.733                         | 0.0199 | 96.3  | 9.587             | 0.1580 | 0.0665         | 46 | Vacuum cast into bodies. |
|                         |                               |        |       |                   |        |                |    |                          |
|                         |                               |        |       |                   |        |                |    |                          |
|                         |                               |        |       |                   |        |                |    |                          |
|                         |                               |        |       |                   |        |                |    |                          |
|                         |                               |        |       |                   |        |                |    |                          |



SMALL SCALE GAP TEST (SSGT) DATA  
H-6

C4a1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: H-6\*

X NO.: ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.: CH No. 4171

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:  
NOL

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

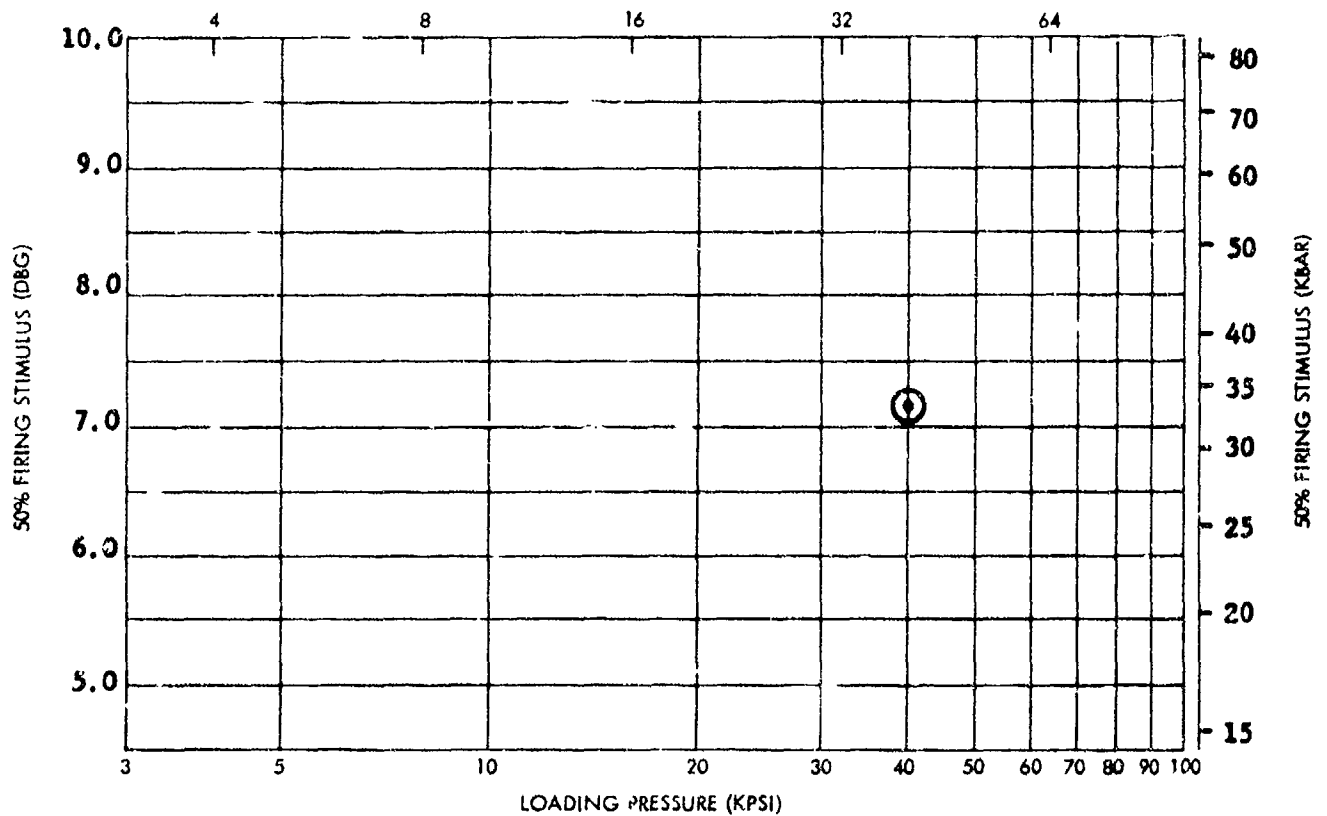
Remarks

\*Composition: RDX----- 45%  
TNT----- 30%  
Aluminum---- 20%  
D-2 Wax----- 5%  
(plus 0.5%  $\text{CaCl}_2$ )

NOLTR 73-132

|           |      |           |   |              |      |
|-----------|------|-----------|---|--------------|------|
| EXPLOSIVE | H-6  | X NO.     | - | Date of Test | 3/60 |
| TMD       | 1.80 | I. D. NO. | - |              |      |

| LOADING PRESSURE (KPSI) | DENSITY (GM./CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|--------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                           | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 40                      | 1.708                          | 0.0036 | 94.9  | 7.182             | 0.0397 | 0.0175         | 46 |         |
|                         |                                |        |       |                   |        |                |    |         |
|                         |                                |        |       |                   |        |                |    |         |
|                         |                                |        |       |                   |        |                |    |         |
|                         |                                |        |       |                   |        |                |    |         |
|                         |                                |        |       |                   |        |                |    |         |
|                         |                                |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
H-6

C4b1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: H-6 (Granular)\*

X NO.: ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: LOT NO.:

INITIAL QUANTITY: BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

\*Composition: RDX----- 45%  
TNT----- 30%  
Aluminum---- 20%  
D-2 Wax----- 5%  
(plus 0.5%  $\text{CaCl}_2$ )

C 4 b 2

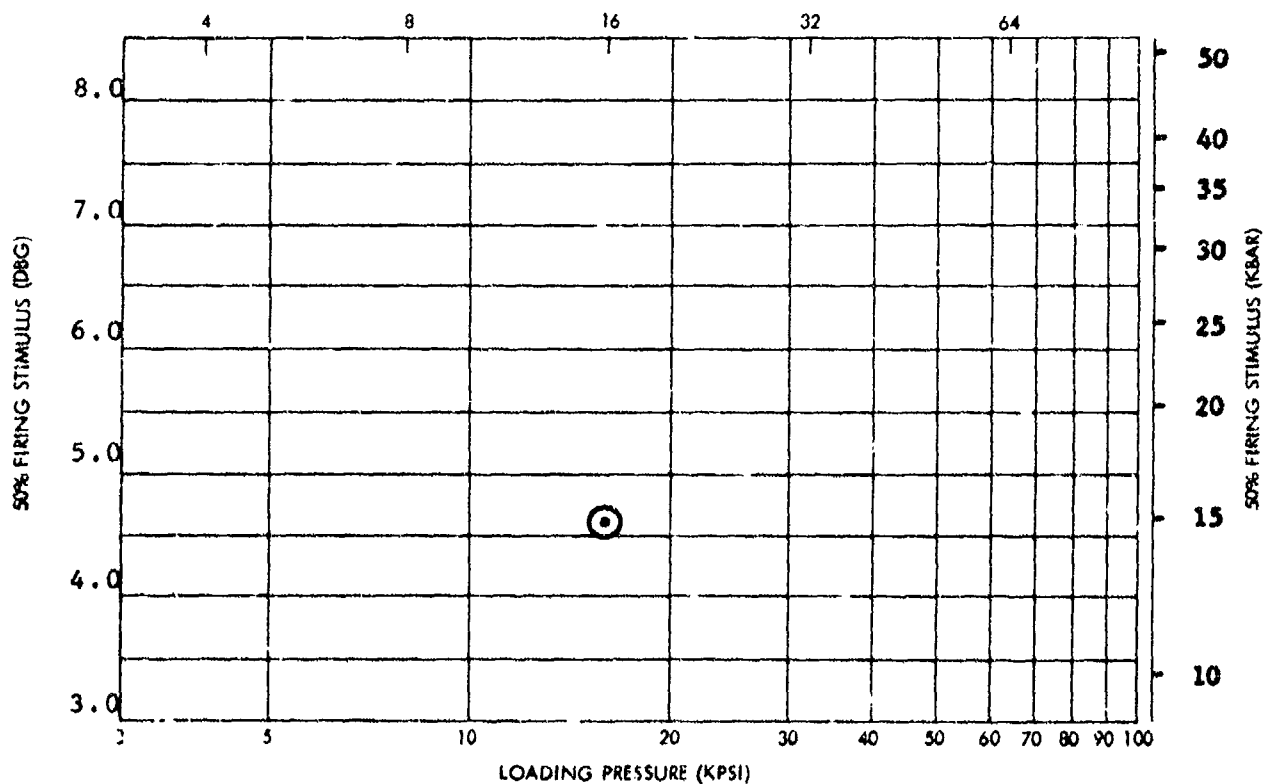
4 Sep 1973

EXPLOSIVE **COMP A-5**  
TMD **1.78**

X NO. **815**  
I. D. NO. **1641**

Date of Test  
**8/72**

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |               | % TMD       | SENSITIVITY (DBG) |               |                |           | REMARKS |
|-------------------------|-------------------------------|---------------|-------------|-------------------|---------------|----------------|-----------|---------|
|                         | AVG.                          | s             |             | AVG.              | g             | s <sub>m</sub> | N         |         |
| <b>16</b>               | <b>1.700</b>                  | <b>0.0078</b> | <b>95.5</b> | <b>4.616</b>      | <b>0.0038</b> | <b>0.0034</b>  | <b>20</b> |         |
|                         |                               |               |             |                   |               |                |           |         |
|                         |                               |               |             |                   |               |                |           |         |
|                         |                               |               |             |                   |               |                |           |         |
|                         |                               |               |             |                   |               |                |           |         |
|                         |                               |               |             |                   |               |                |           |         |



C5a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: COMP A-5 \*

X NO.: 44 ID: 1641 Z NO.: SSGT LOAD ORDER NO.:

SOURCE: RWC China Lake N50530-2151-9543

CHEMICAL NAME:

DATE RECEIVED: 6/7/72

LOT NO.: 015-29

INITIAL QUANTITY: 1 pound

BATCH NO.: 3-119

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50¢ point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

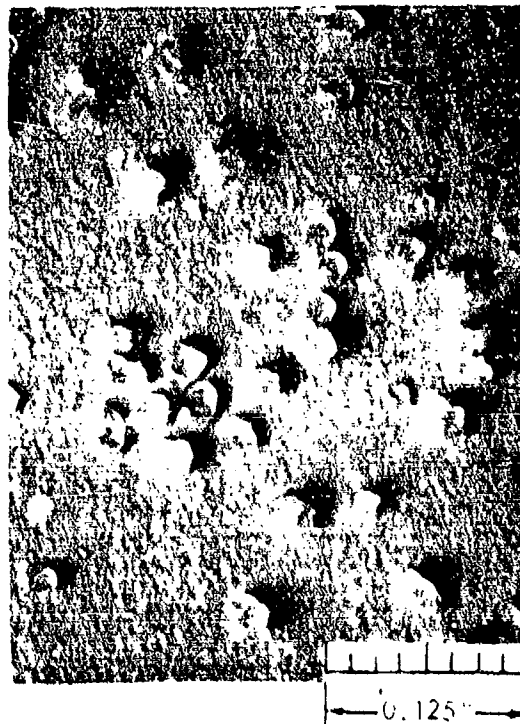
§ = cm

s = log units

n =

Remarks

\*Composition: RDX/STEARIC ACID  
(98.5/1.5)



C 5 a 2

4 Sep 1973

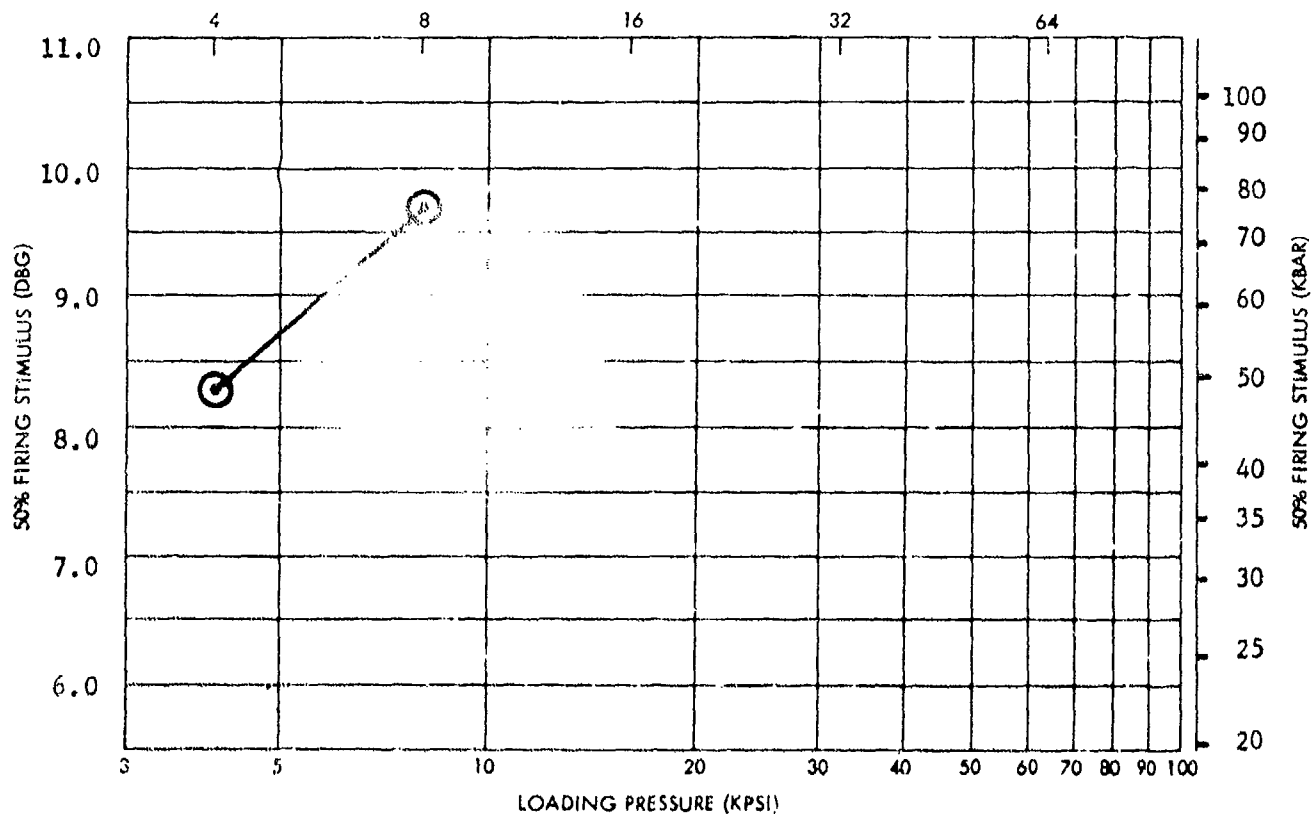
NCLTR 73-132

|           |                 |           |     |
|-----------|-----------------|-----------|-----|
| EXPLOSIVE | NI. ROGUANIDINE | X NO.     | 547 |
| TMD       | 1.78            | I. D. NO. | -   |

Date of Test  
10/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 1.3                     | 0.954                         | 0.0105 | 53.6  | 6.387             | 0.0458 | 0.0244         | 28 |         |
| 2.                      | 1.021                         | 0.0095 | 57.4  | 6.951             | 0.1016 | 0.0500         | 28 |         |
| 4.1                     | 1.161                         | 0.0098 | 65.2  | 8.285             | 0.1379 | 0.0685         | 22 |         |
| 8.                      | 1.273                         | 0.0062 | 71.5  | 9.689             | -      | -              | 28 | (1)     |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
NITROGUANIDINE

C6a1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: NITROGUANIDINE, LOW BULK DENSITY

X NO.: 547 ID: Z NO.: 669 SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 9/1/65

LOT NO.: NCW-2-2984

INITIAL QUANTITY: 200 pounds

BATCH NO.: Drum 198 8/54

MANUFACTURED BY:  
Naval Propellant Plant  
Indian Head, Md.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST 9/15/67

I => 320 cm

s = log units

n =

Remarks

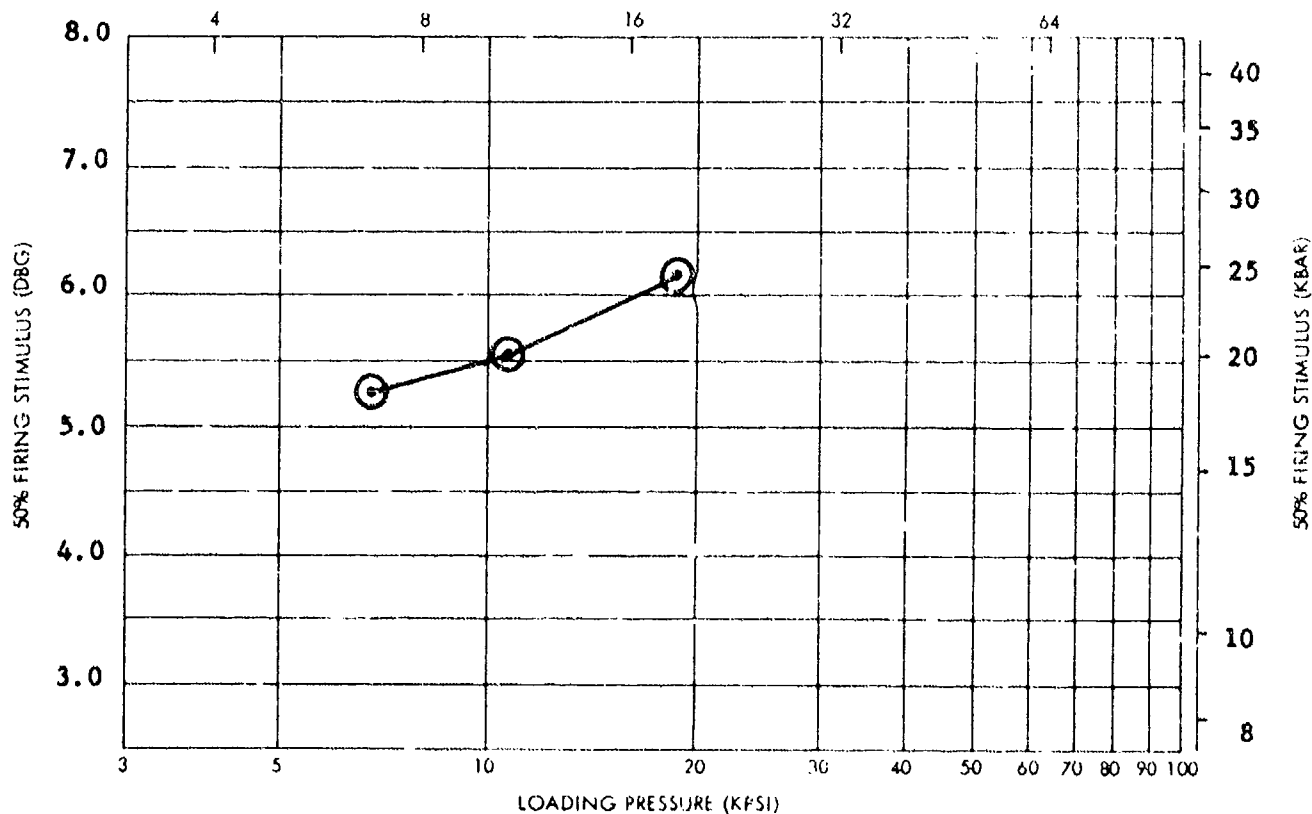
C 6 a 2

4 Sep 1973



|           |              |           |            |                             |
|-----------|--------------|-----------|------------|-----------------------------|
| EXPLOSIVE | <b>TNT</b>   | X NO.     | <b>159</b> | Date of Test<br><b>4/60</b> |
| TMD       | <b>1.651</b> | I. D. NO. | <b>~</b>   |                             |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 7.0                     | 1.413                         | 0.0041 | 85.6  | 5.255             | 0.0237 | 0.0107         | 46 |         |
| 11.0                    | 1.489                         | 0.0068 | 90.2  | 5.523             | 0.1428 | 0.0493         | 46 |         |
| 19.0                    | 1.568                         | 0.0039 | 95.0  | 6.130             | 0.0429 | 0.0176         | 46 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
TNT

C7a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TNT

X NO.: 159 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: Trinitrotoluene

DATE RECEIVED: 8/14/52

LOT NO.:

INITIAL QUANTITY: 3000 pounds  
Expanded 6 Sep 66

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

# = cm

s = log units

n =

Remarks

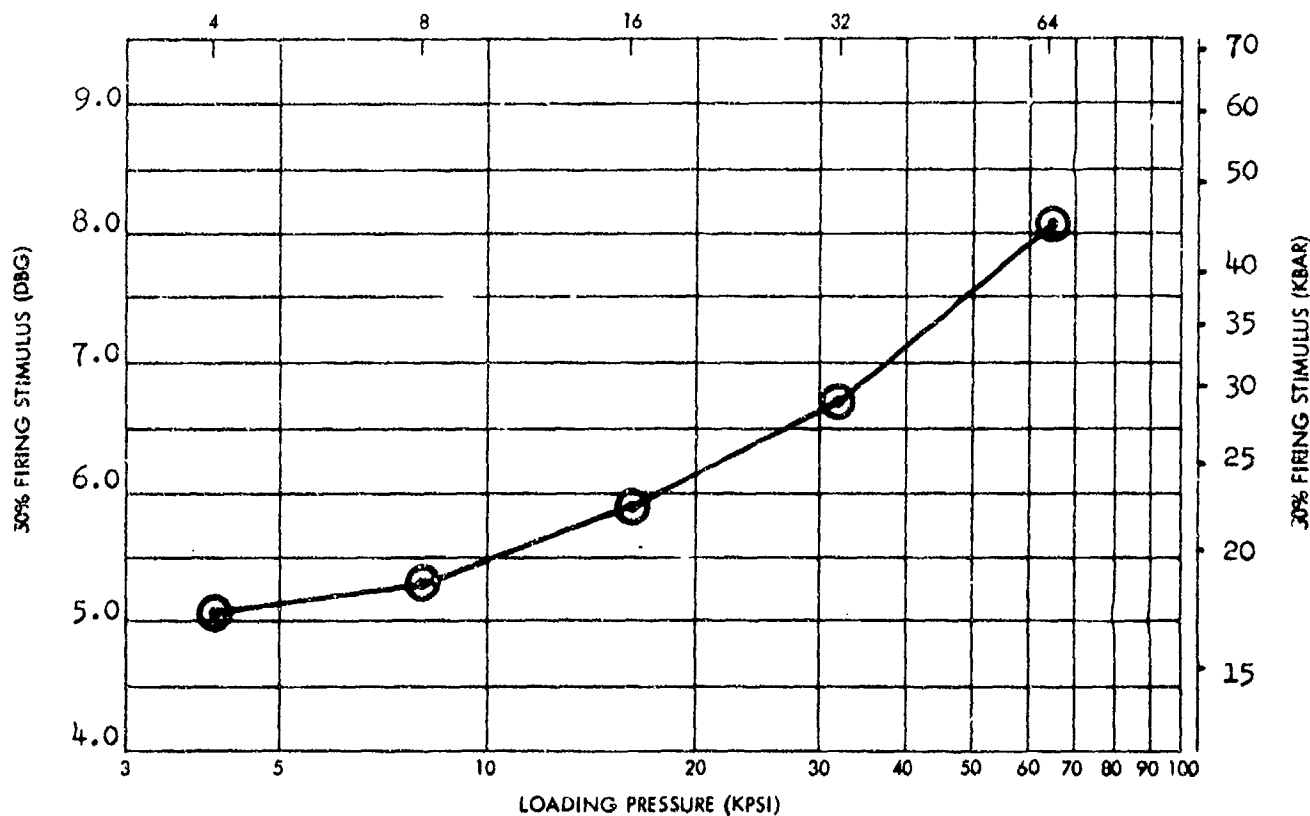
C 7 a 2

4 Sep 1973

NOLTR 73-132

|           |       |           |     |                      |
|-----------|-------|-----------|-----|----------------------|
| EXPLOSIVE | TNT   | X NO.     | 412 | Date of Test<br>3/64 |
| TMD       | 1.651 | I. D. NO. | -   |                      |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.353                         | 0.0130 | 82.0  | 5.067             | 0.0321 | 0.0274         | 18 |         |
| 8                       | 1.446                         | 0.0072 | 87.6  | 5.316             | 0.0338 | 0.0277         | 18 |         |
| 16                      | 1.549                         | 0.0024 | 93.8  | 5.877             | 0.0645 | 0.0366         | 18 |         |
| 32                      | 1.623                         | 0.0019 | 98.3  | 6.703             | 0.0434 | 0.0321         | 10 |         |
| 64                      | 1.651                         | 0.0025 | 100.0 | 8.066             | 0.0710 | 0.0446         | 18 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
TNT

C7b1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: TNT\*

X NO.: 412      ID:      Z NO.:      SSGT LOAD ORDER NO.: 953

SOURCE:

CHEMICAL NAME: Trinitrotoluene

DATE RECEIVED: 12/12/62      LOT NO.:

INITIAL QUANTITY: 5000 pounds      BATCH NO.:  
Expended 9/6/66

MANUFACTURED BY:

IMPACT SENSITIVITY (S or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST 12/2/64

S = 227 cm

s = 0.17 log units

n =

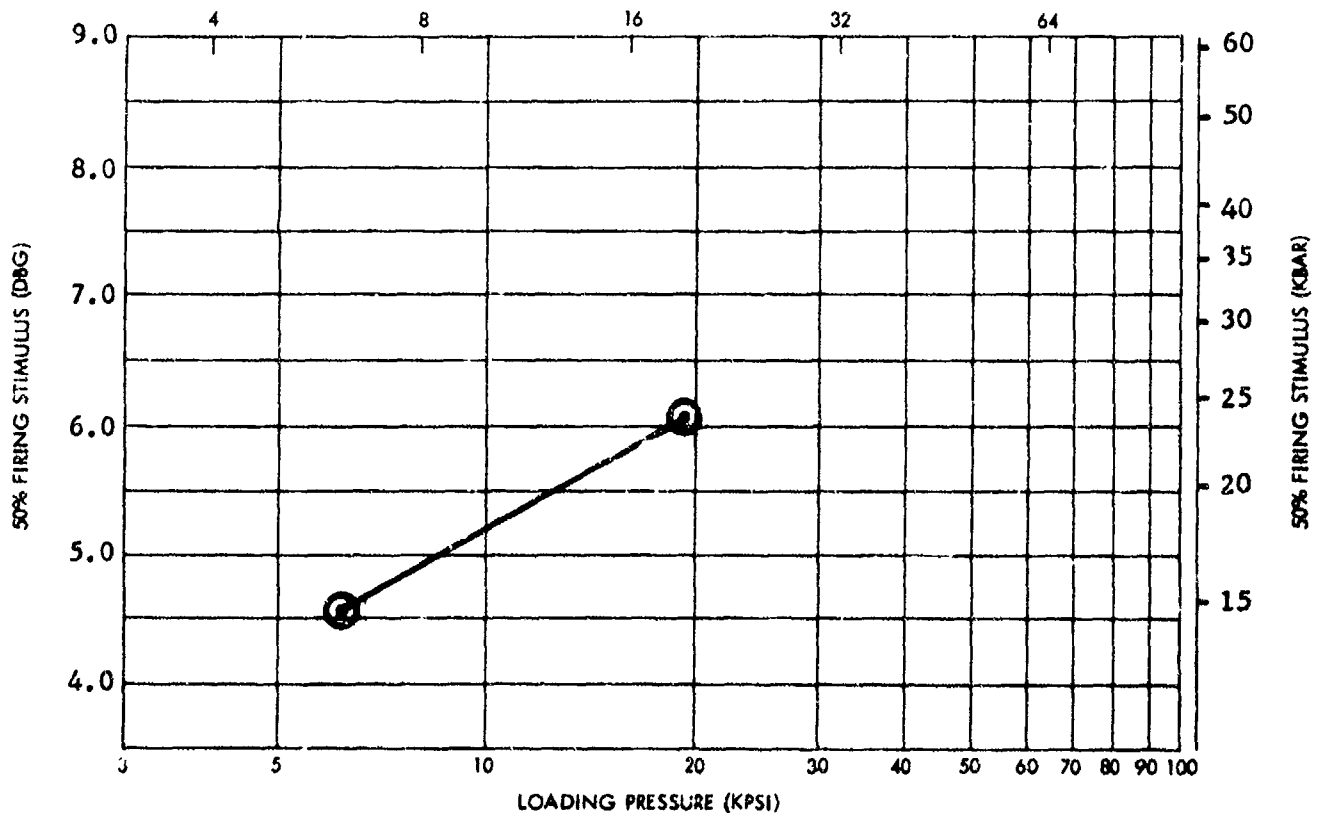
Remarks

\*Had trouble with this TNT in  
isostatic press. Had two fires  
at elevated temperatures.

NOLTR 73-132

|           |              |           |          |                             |
|-----------|--------------|-----------|----------|-----------------------------|
| EXPLOSIVE | <u>TNT</u>   | X NO.     | <u>-</u> | Date of Test<br><b>9/59</b> |
| TMD       | <u>1.651</u> | I. D. NO. | <u>-</u> |                             |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 6.2                     | 1.386                         | 0.0066 | 83.9  | 4.551             | 0.0495 | 0.0317         | 53 |         |
| 19                      | 1.561                         | 0.0064 | 94.5  | 6.095             | 0.1186 | 0.0539         | 42 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
TNT

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TNT

X NO.: ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: Trinitrotoluene

DATE RECEIVED: LOT NO.:

INITIAL QUANTITY: BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

(1) No information available

NOLTR 73-132

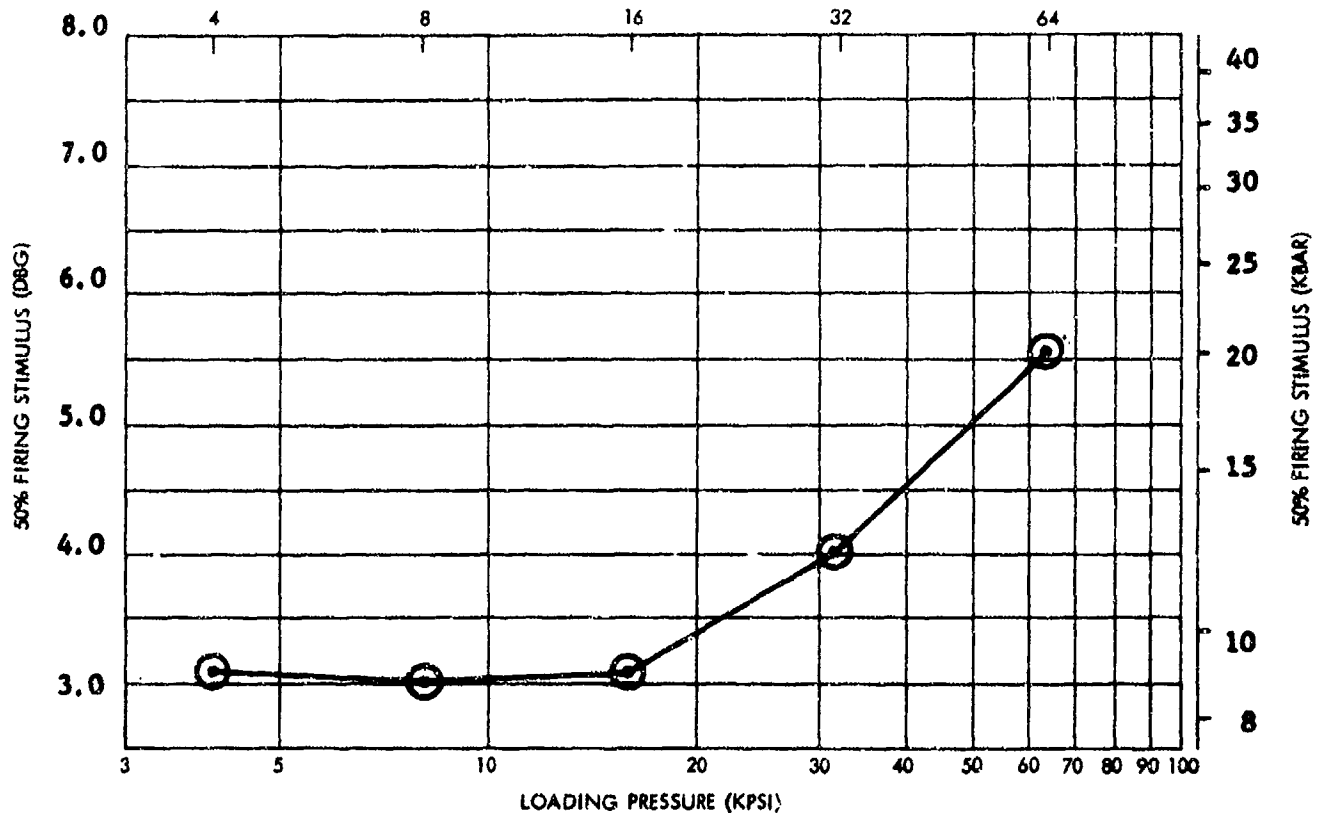
EXPLOSIVE **PENTOLITE (50/50)**  
TMD **1.71**

X NO. **551**  
I. D. NO. **-**

Date of Test  
**8/66**

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD        | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|--------------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |              | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.363                         | 0.0029 | 79.7         | 3.097             | 0.0121 | 0.0151         | 23 |         |
| 8                       | 1.465                         | 0.0100 | 85.7         | 3.013             | 0.0259 | 0.0243         | 23 |         |
| 16                      | 1.571                         | 0.0060 | 91.9         | 3.082             | 0.0189 | 0.0150         | 23 |         |
| 32                      | 1.671                         | 0.0075 | 97.7         | 4.030             | 0.0960 | 0.0514         | 23 |         |
| 64                      | 1.721                         | 0.0020 | (1)<br>100.6 | 5.544             | 0.0572 | 0.0328         | 23 |         |
|                         |                               |        |              |                   |        |                |    |         |

(1) Experimental error



SMALL SCALE GAP TEST (SSGT) DATA  
**PENTOLITE (50/50)**

C8a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PENTOLITE (50/50)\*

X NO.: 551 ID: Z NO.: SSGT LOAD ORDER NO.: 1146

SOURCE: NAD Crane, Indiana

CHEMICAL NAME:

DATE RECEIVED: 12/1/65

LOT NO.: PLM 49 & 272

INITIAL QUANTITY: 9900 pounds

BATCH NO.:

MANUFACTURED BY:  
Plumbrook Ordnance  
Plumbrook, Ohio

IMPACT SENSITIVITY (§ or 50% point)\*\*  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

DATE OF TEST

DATE OF RETEST

1/5/66

2/10/66

s = 18 cm

21 cm

s = 0.07 log units

0.05 log units

n =

Remarks

\*Composition: PETN/TNT (50/50)

\*\*Cast and ground and put through  
16, 30 and 50 mesh sieves.  
Sensitivity measured on mixture of  
equal parts of fractions staying  
on 30 mesh and on 50 mesh sieves.



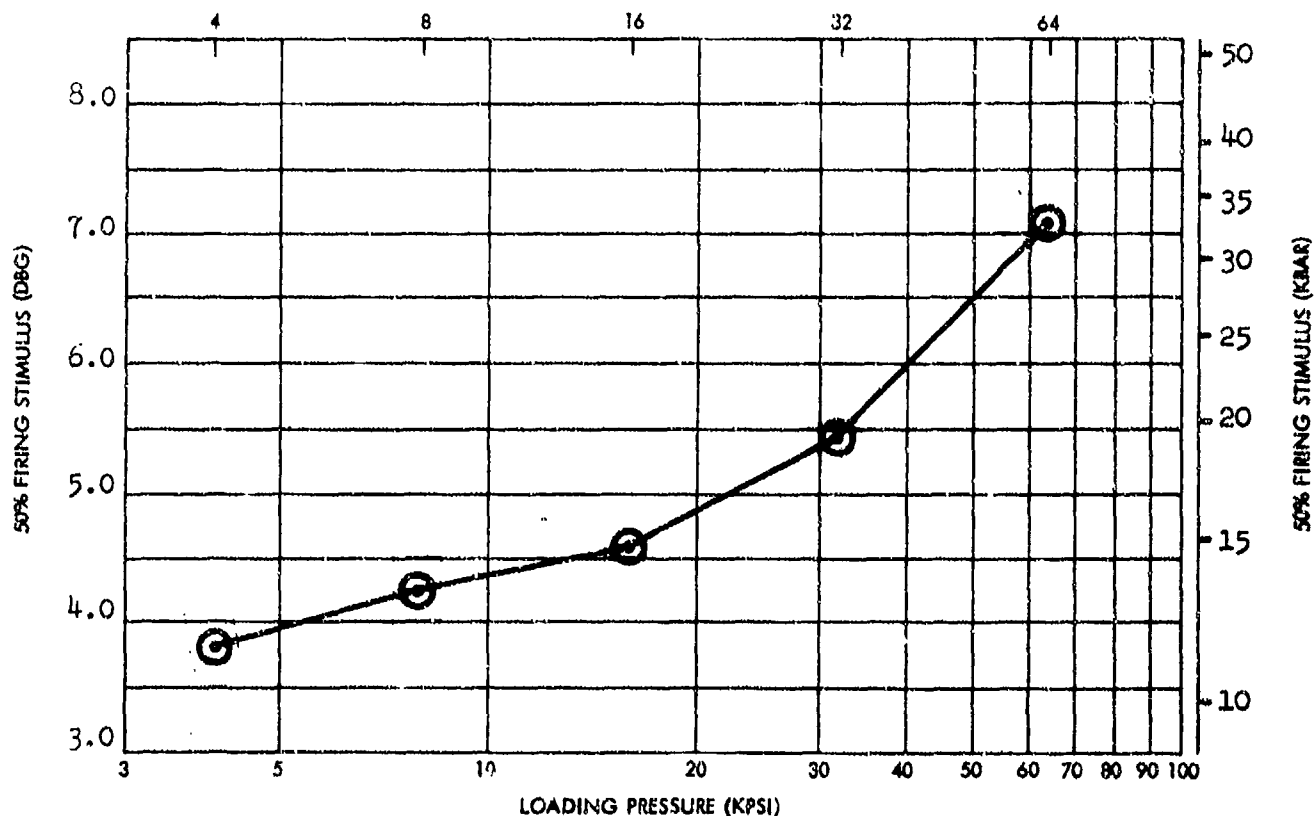
NOLTR 73-132

EXPLOSIVE | OCTOL (75/25)  
TMD | 1.83

X NO. | 469  
I. D. NO. | -

Date of Test  
7/66

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 4                       | 1.541                         | 0.0048 | 84.2  | 3.795             | 0.0435 | 0.0289         | 18 |         |
| 8                       | 1.613                         | 0.0030 | 88.1  | 4.251             | 0.0245 | 0.0171         | 18 |         |
| 16                      | 1.677                         | 0.0032 | 91.6  | 4.603             | 0.0209 | 0.0210         | 18 |         |
| 32                      | 1.761                         | 0.0032 | 96.2  | 5.460             | 0.0184 | 0.0255         | 23 |         |
| 64                      | 1.829                         | 0.0020 | 100.0 | 7.086             | 0.0174 | 0.0212         | 18 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
OCTOL (75/25)

C9a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: OCTOL (75/25)\*

X NO.: 469      ID:      Z NO.:      SSGT LOAD ORDER NO.: 1142

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 4/8/64

LOT NO.: HOL 85-4

INITIAL QUANTITY: 500 pounds

BATCH NO.: 696-3

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.  
Jan 1964

IMPACT SENSITIVITY (1/2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

1/2 =      cm

s =      log units

n =

Remarks

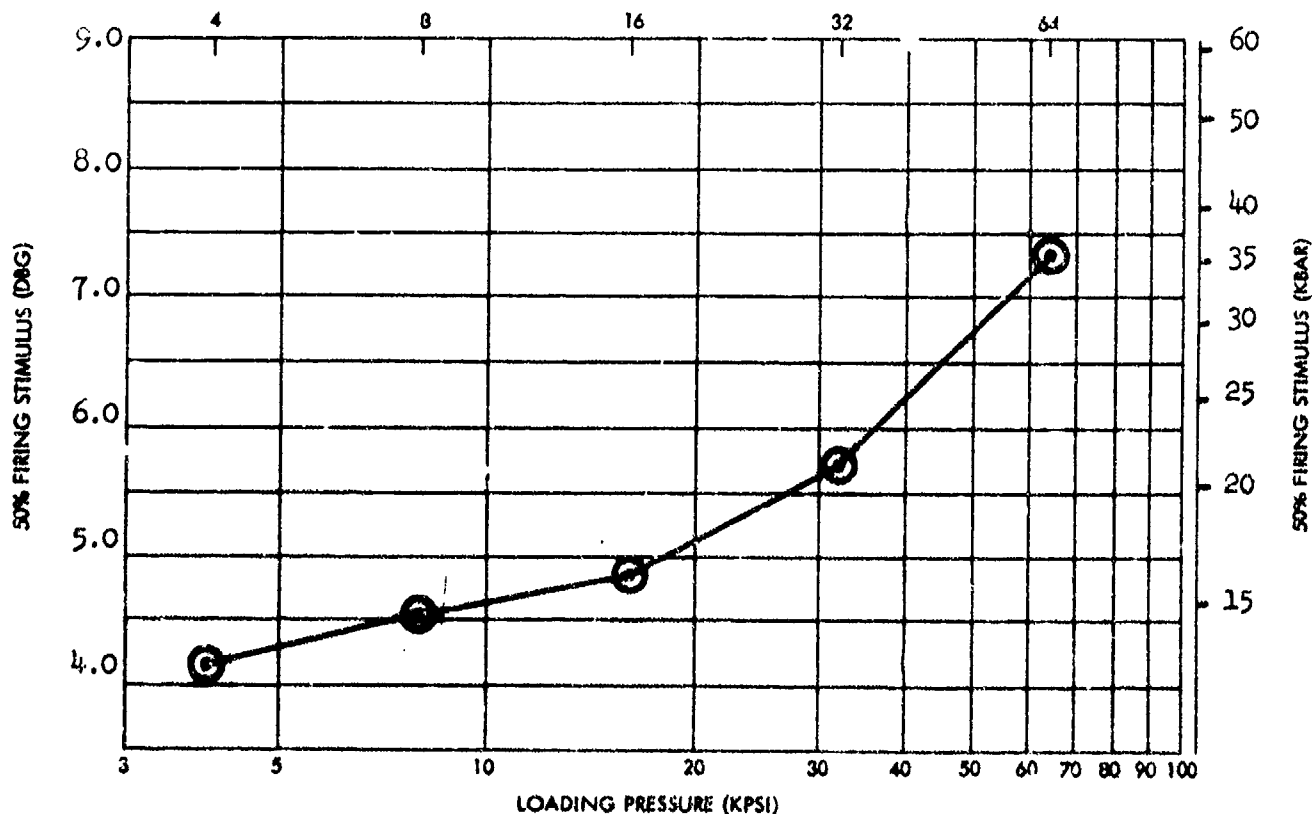
\*Composition: HMX/TNT (75/25)

NOLTR 73-132

|           |               |           |     |              |
|-----------|---------------|-----------|-----|--------------|
| EXPLOSIVE | OCTOL (65/35) | X NO.     | 293 | Date of Test |
| TMD       | 1.81          | I. D. NO. | -   | 7/66         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (D&G) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.539                         | 0.0048 | 85.0  | 4.159             | 0.0187 | 0.0202         | 23 |         |
| 8                       | 1.620                         | 0.0062 | 89.5  | 4.530             | 0.0191 | 0.0202         | 23 |         |
| 16                      | 1.699                         | 0.0356 | 93.9  | 4.870             | 0.0163 | 0.0106         | 23 |         |
| 32                      | 1.768                         | 0.0027 | 97.7  | 5.743             | -      | -              | 23 | (1)     |
| 64                      | 1.810                         | 0.0023 | 100.0 | 7.316             | 0.0667 | 0.0373         | 23 |         |
| -                       | 1.602                         | 0.3242 | 88.5  | 8.545             | 0.1153 | 0.0507         | 29 | Cast    |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
OCTOL (65/35)

C10a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: OCTOL (65/35) \*

X NO.: 293      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 7/24/58

LOT NO.: W-11-173-ORD-35

INITIAL QUANTITY: 2,539 pounds

BATCH NO.:

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  =      cm

s =      log units

n =

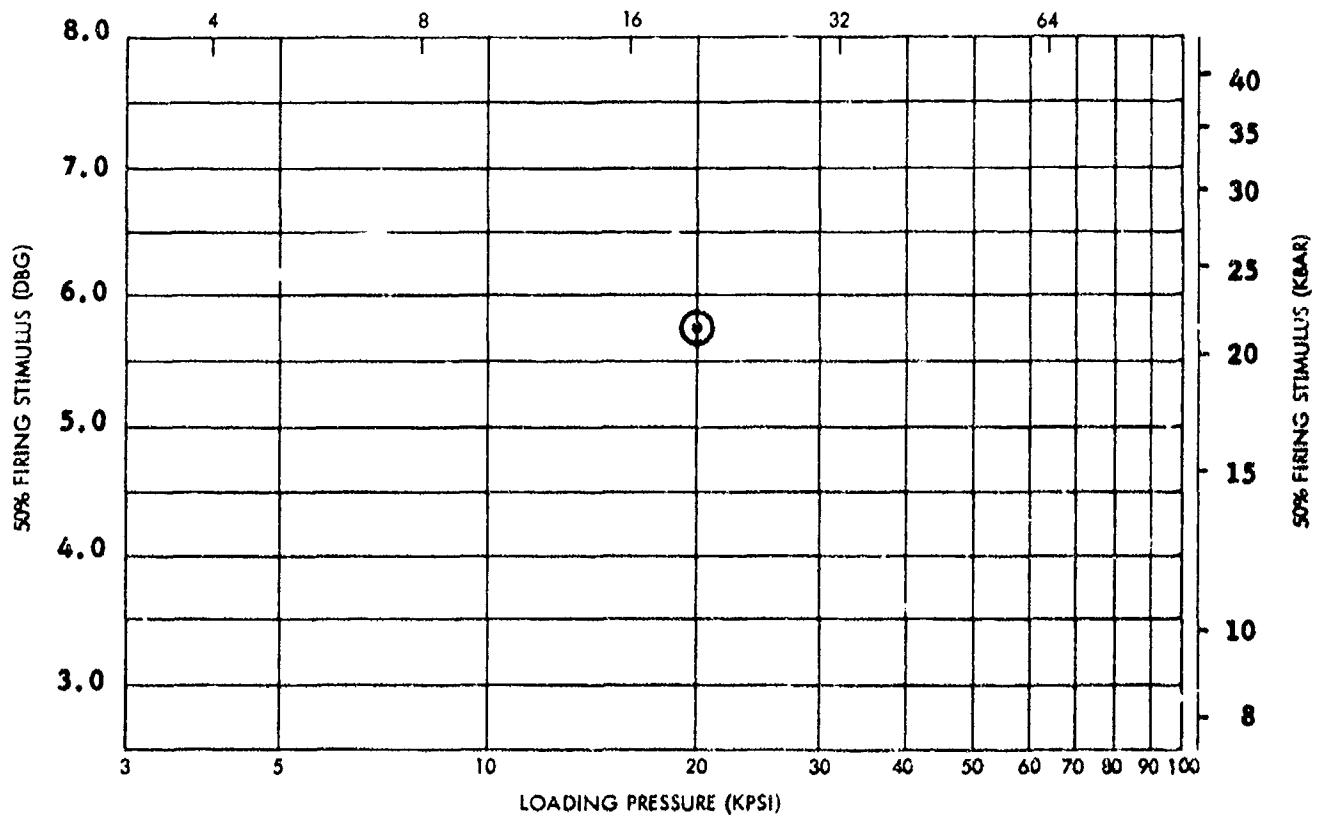
Remarks

\*Composition: HMX/TNT (65/35)

NOLTR 73-132

|           |        |           |       |              |
|-----------|--------|-----------|-------|--------------|
| EXPLOSIVE | COMP-B | X NO.     | 279   | Date of Test |
| TMD       | 1.72   | I. D. NO. | Z 311 | 4/60         |

| LOADING PRESSURE (KPSI) | DENSITY (G/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                         | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 20                      | 1.629                        | 0.0036 | 94.7  | 5.745             | 0.0239 | 0.0104         | 46 |         |
|                         |                              |        |       |                   |        |                |    |         |
|                         |                              |        |       |                   |        |                |    |         |
|                         |                              |        |       |                   |        |                |    |         |
|                         |                              |        |       |                   |        |                |    |         |
|                         |                              |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
COMP B

C11a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: COMP B \*

X NO.: 279 ID: Z NO.: 311 SSGT LOAD ORDER NO.: 660

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 4/1/60

LOT NO.:

INITIAL QUANTITY: 1/2 pound

BATCH NO.:

MANUFACTURED BY:  
NOL:WE Division\*\*

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\kappa$  = cm

s = log units

n =

Remarks

\*Composition: RDX/TNT (60/40)  
plus 1% wax.

\*\*"Mixed and ground by WE  
4/1/60 in sigma mixer."

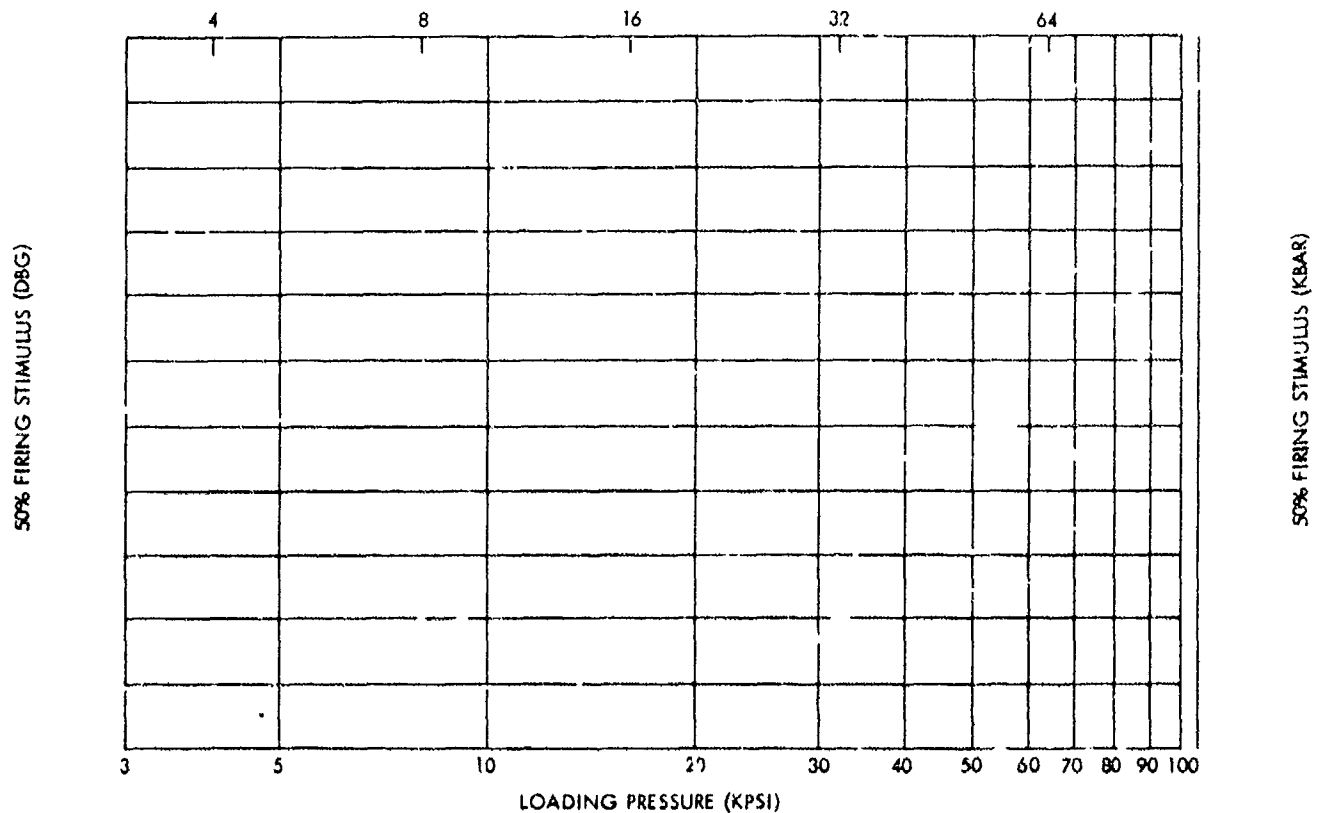
NOLTR 73-132

EXPLOSIVE COMP B  
TMD 1.72

X NO. 479  
I. D. NO. -

Date of Test  
6/66

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| -                             | 1.529                            | 0.2194 | 88.9  | 8.929             | 0.1895 | 0.0915         | 29 | Cast    |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
COMP B

C11b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: COMP B (Cast) \*

X NO.: 479      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 3/28/64      LOT NO.: HOL-7-1870

INITIAL QUANTITY: 900 pounds      BATCH NO.: \*\*

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (\$ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

\$ =      cm

s =      log units

n =

Remarks

\*Composition: RDX/TNT (60/40)  
plus 1% wax.

\* \*Batch No. - 47158, 47164, 47172 to 47174.  
47176 to 47181, 47188 to 47190  
47193 to 47195, 47203, 47207  
47246



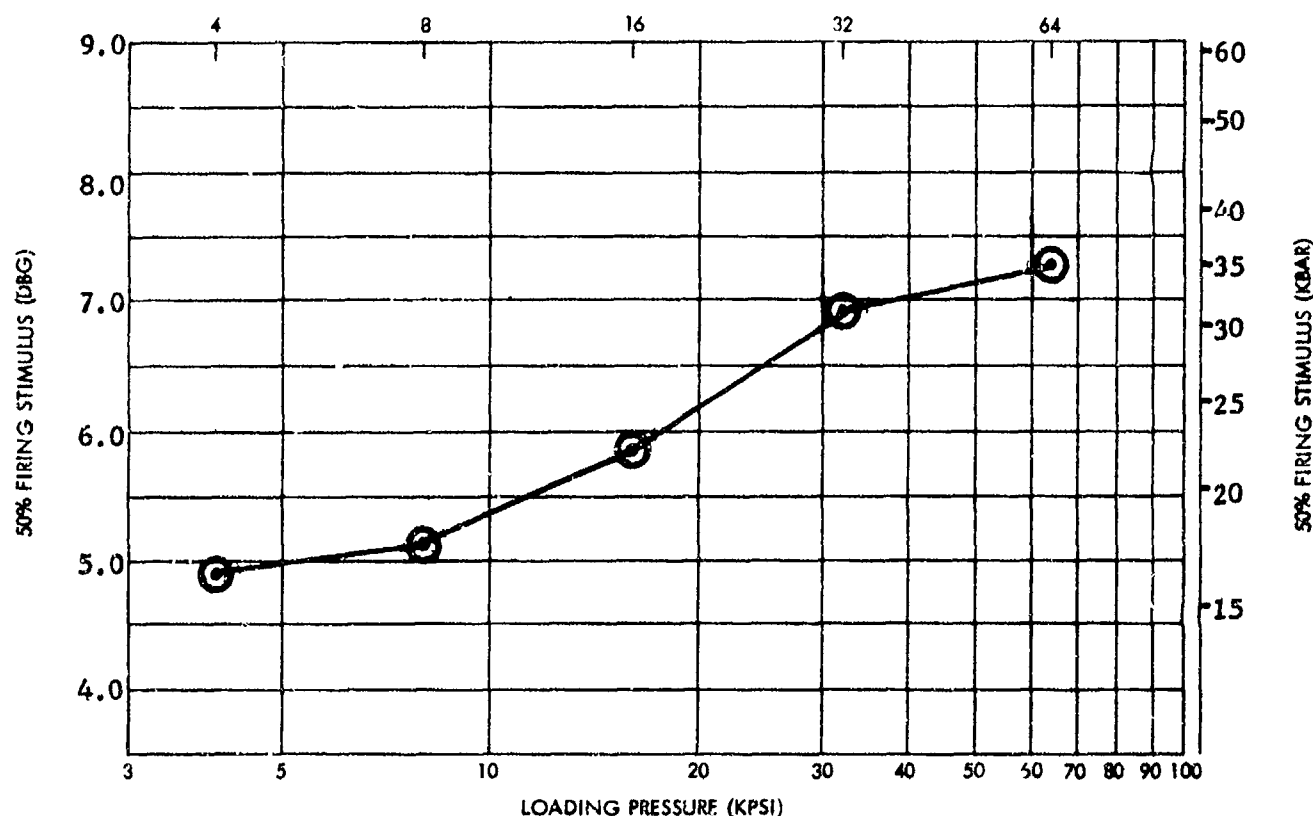
NOLTR 73-132

|           |        |           |     |
|-----------|--------|-----------|-----|
| EXPLOSIVE | COMP B | X NO.     | 576 |
| TMD       | 1.72   | I. D. NO. | -   |

Date of Test  
-

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD        | SENSITIVITY (DBG) |        |        |    | REMARKS |
|-------------------------|-------------------------------|--------|--------------|-------------------|--------|--------|----|---------|
|                         | AVG.                          | %      |              | AVG.              | g      | %m     | N  |         |
| 4                       | 1.473                         | 0.0083 | 85.6         | 4.904             | 0.0194 | 0.0267 | 18 |         |
| 8                       | 1.558                         | 0.0044 | 90.6         | 5.127             | -      | -      | 18 | (1)     |
| 16                      | 1.652                         | 0.0034 | 96.0         | 5.863             | 0.0181 | 0.0288 | 18 |         |
| 32                      | 1.716                         | 0.0027 | 99.8         | 6.942             | 0.0660 | 0.0271 | 23 |         |
| 64                      | 1.735                         | 0.0015 | (2)<br>100.9 | 7.277             | -      | -      | 18 | (1)     |
|                         |                               |        |              |                   |        |        |    |         |

- (1) No mixed response zone  
(2) Experimental error



SMALL SCALE GAP TEST (SSGT) DATA  
COMP B

C11c1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: COMP-B \*

X NO.: 576 ID: Z NO.: SSGT LOAD ORDER NO.: 1144

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 7/26/66

LOT NO.:

INITIAL QUANTITY: 1 pound

BATCH NO.:

MANUFACTURED BY:  
NOL: WE Division  
Bldg 318

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

\* Pellet grade from X479

Composition: RDX/TNT (60/40)  
plus 1% wax.

NOLTR 73-132

EXPLOSIVE HBX-3

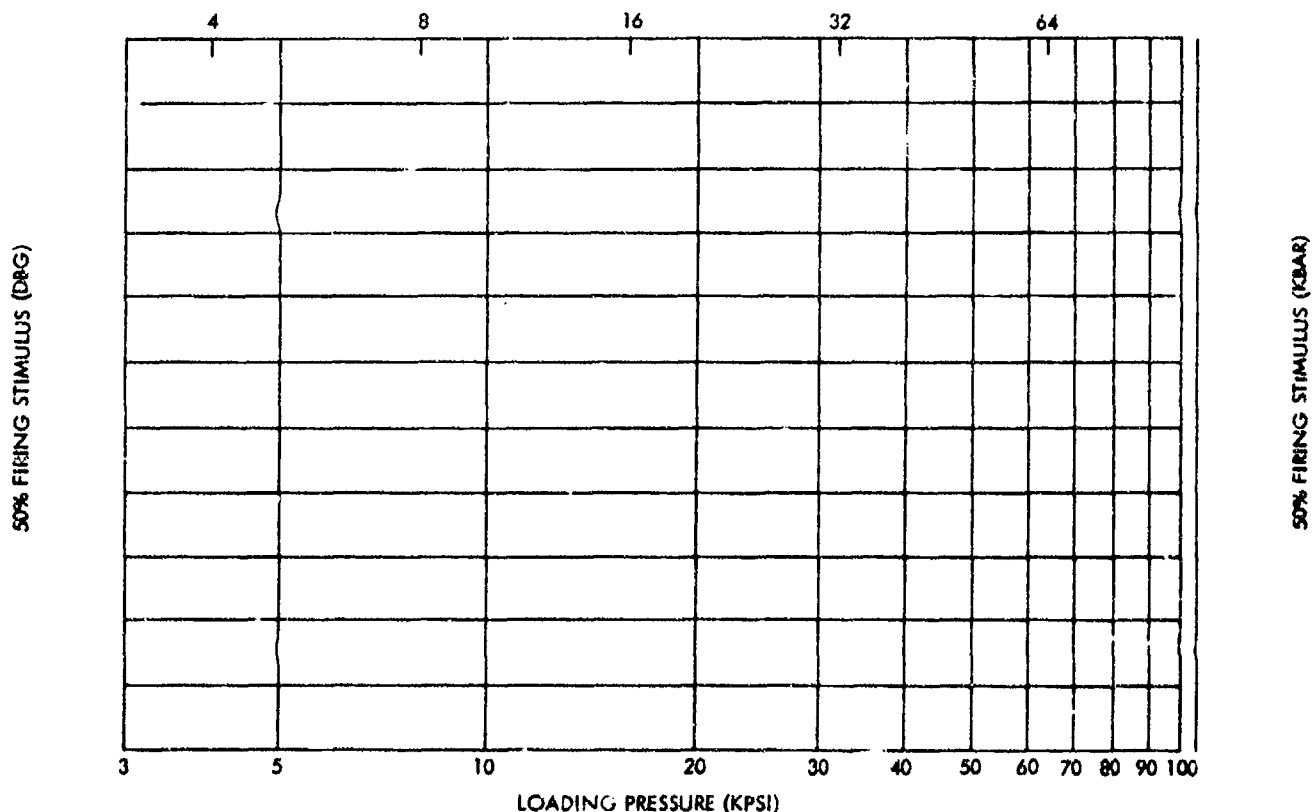
X NO. -

Date of Test  
3/60

TMD 1.89

I. D. NO. -

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS                    |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|----------------------------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |                            |
| -                             | 1.827                            | 0.0252 | 96.7  | 9.938             | 0.0740 | 0.0725         | 46 | Vacuum cast into<br>bodies |
|                               |                                  |        |       |                   |        |                |    |                            |
|                               |                                  |        |       |                   |        |                |    |                            |
|                               |                                  |        |       |                   |        |                |    |                            |
|                               |                                  |        |       |                   |        |                |    |                            |
|                               |                                  |        |       |                   |        |                |    |                            |



SMALL SCALE GAP TEST (SSGT) DATA  
HBX-3

C12 a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HBX-3 \*

X NO.:            ID:            Z NO.:            SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.: CH No. 4170

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ =            cm

s =            log units

n =

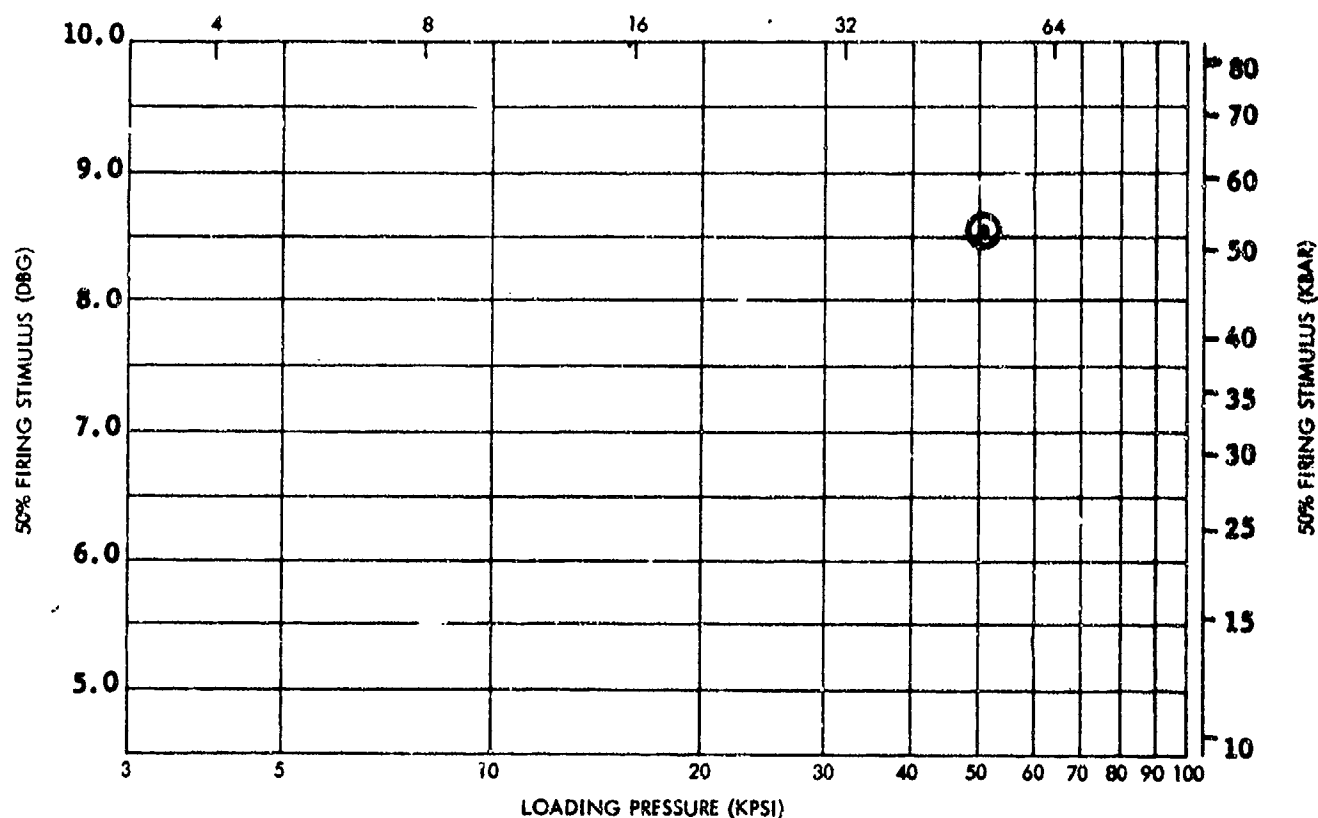
Remarks

\*Composition: RDX-----31%  
Tetryl-----29%  
Aluminum----35%  
D-2 wax.----- 5%  
(plus 0.5% CaCl<sub>2</sub>)

NOLTR 73-132

|           |      |           |   |              |
|-----------|------|-----------|---|--------------|
| EXPLOSIVE | DATB | X NO.     | - | Date of Test |
| TMD       | 1.84 | I. D. NO. | - | 3/60         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 50.2                    | 1.732                         | 0.0072 | 94.1  | 8.535             | 0.0329 | 0.0137         | 46 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATE

X NO.: ID: S NO.: SSGT LOAD ORDER NO.: 657

SOURCE:

CHEMICAL NAME: 1,3 - Diamino-2,4,6 - trinitrobenzene

DATE RECEIVED: LOT NO.:

INITIAL QUANTITY: BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

S = cm

S = log units

n =

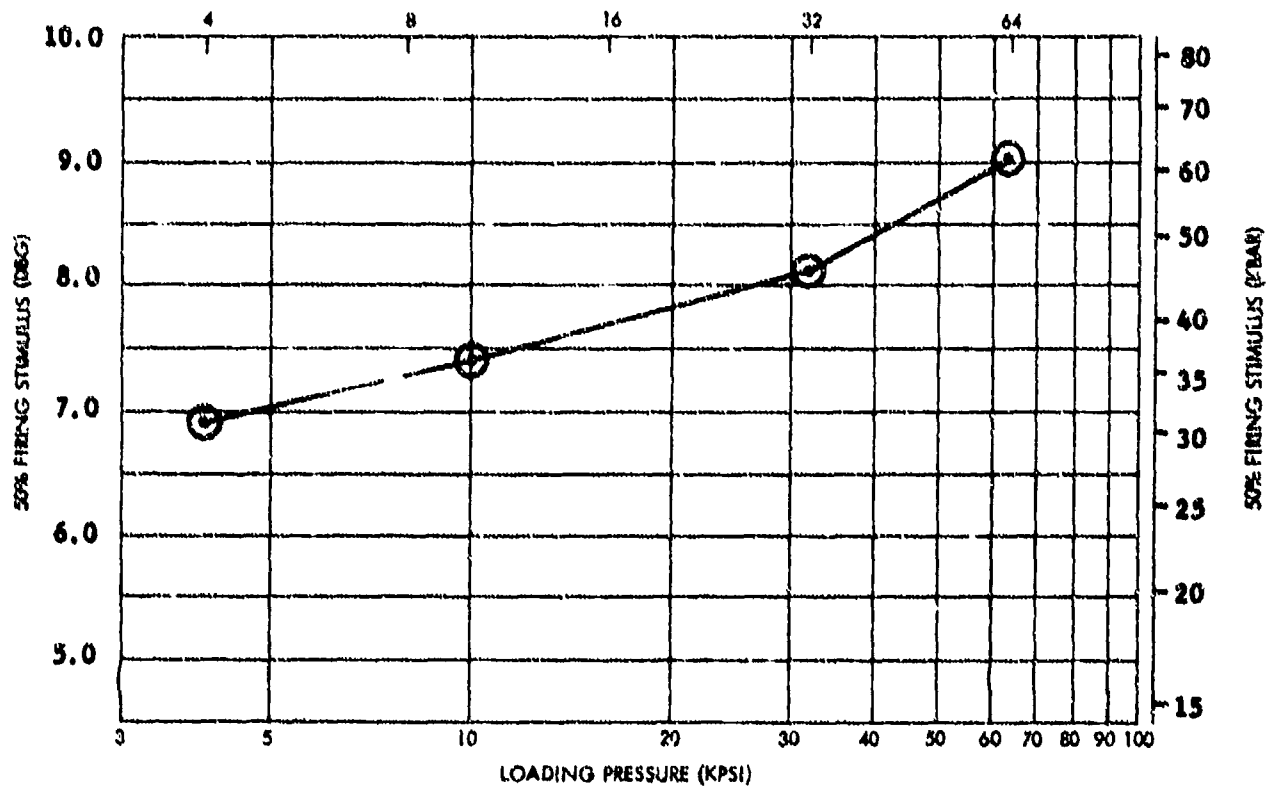
Remarks

NOLTR 73-132

|           |       |           |     |              |
|-----------|-------|-----------|-----|--------------|
| EXPLOSIVE | DATE  | X NO.     | 315 | Date of Test |
| YMD       | 1. 84 | I. D. NO. | *   | 10/60        |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % YMD | SENSITIVITY (DBG) |       |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|-------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | s     | s <sub>m</sub> | N  |         |
| 4                       | 1.233                         | 0.0219 | 67.0  | 6.909             | -     | -              | 12 | (1)     |
| 10                      | 1.455                         | 0.0087 | 79.1  | 7.411             | -     | -              | 8  | (1)     |
| 32                      | 1.676                         | 0.0060 | 91.1  | 8.153             | -     | -              | 8  | (1)     |
| 64                      | 1.763                         | 0.0057 | 95.8  | 9.006             | 0.837 | 0.0793         | 12 |         |
|                         |                               |        |       |                   |       |                |    |         |
|                         |                               |        |       |                   |       |                |    |         |

(1) No mixed response seen



SMALL SCALE GAP TEST (SSGT) DATA  
DATE

D1b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATEB

X NO.: 315 ID: Z NO.: 365 SSGT LOAD ORDER NO.: 702

SOURCE:

CHEMICAL NAME: 1,3 - Dinitro-2,4,6 - trinitrobenzene

DATE RECEIVED: 4/11/60 LOT NO.: SR 3-60

INITIAL QUANTITY: 800 pounds\* BATCH NO.: 2

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

\*600 pounds used to make DATEB/ZYTEL



D 1 b 2

4 Sep 1973



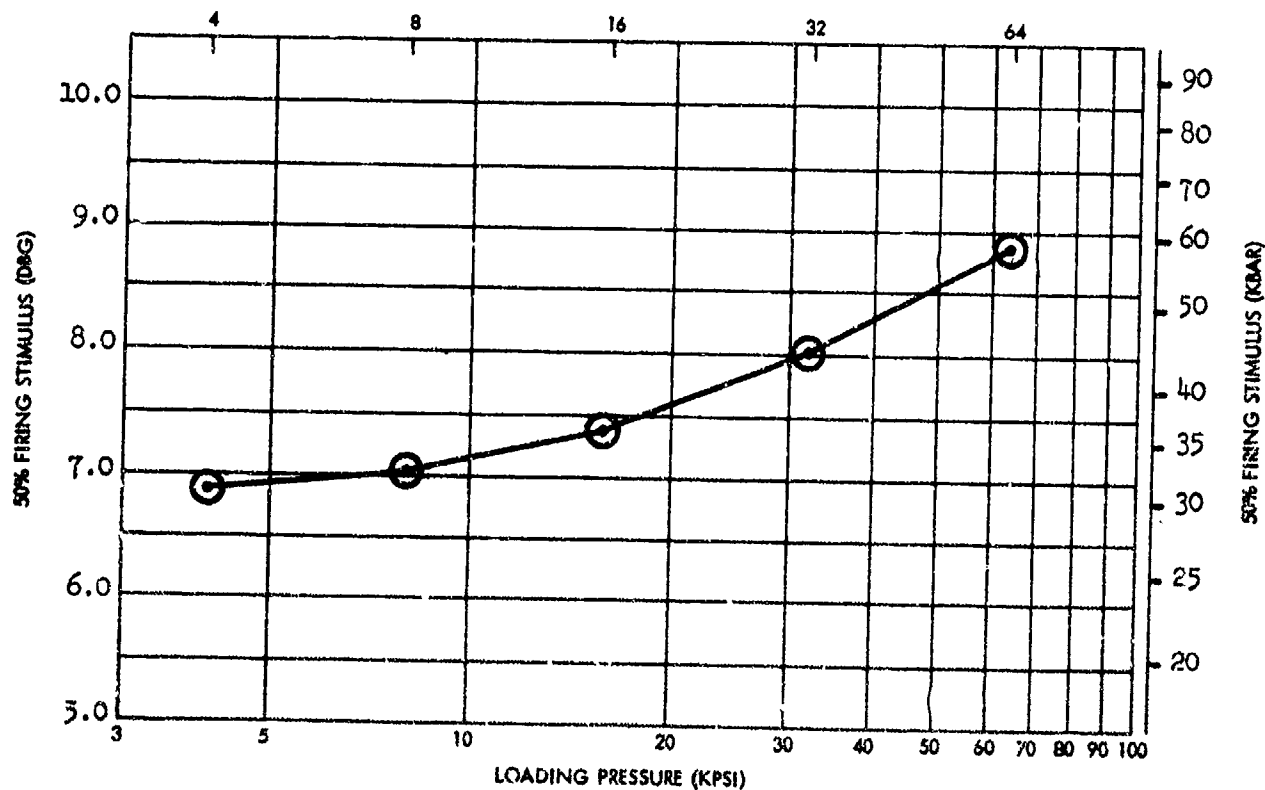
NOLTR 73-132

EXPLOSIVE DATE  
TMD 1.84

X NO. 315  
I. D. NOS. 185 and 921

Date of Test  
11/67

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |        |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|--------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | m      | N  |         |
| 4                       | 1.255                         | 0.0025 | 68.2  | 6.870             | 0.0103 | 0.0060 | 22 |         |
| 8                       | 1.365                         | 0.0043 | 74.2  | 7.042             | 0.0134 | 0.0196 | 20 |         |
| 16                      | 1.518                         | 0.0054 | 82.5  | 7.374             | 0.0122 | 0.0100 | 20 |         |
| 32                      | 1.665                         | 0.0034 | 90.5  | 8.023             | 0.0535 | 0.0316 | 20 |         |
| 64                      | 1.775                         | 0.0083 | 96.5  | 8.682             | 0.0443 | 0.0276 | 20 |         |
|                         |                               |        |       |                   |        |        |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
DATE

D1c1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATB

X NO.: 315      ID: 185 8      Z NO.: 365      SSGT LOAD ORDER NO.: 1208  
921

SOURCE:

CHEMICAL NAME: 1,3 - Diamino-2,4,6 - trinitrobenzene

DATE RECEIVED: 4/11/60

LOT NO.: SR 3-60

INITIAL QUANTITY: 800 pounds\*

BATCH NO.: 2

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY ( $\frac{1}{2}$  or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

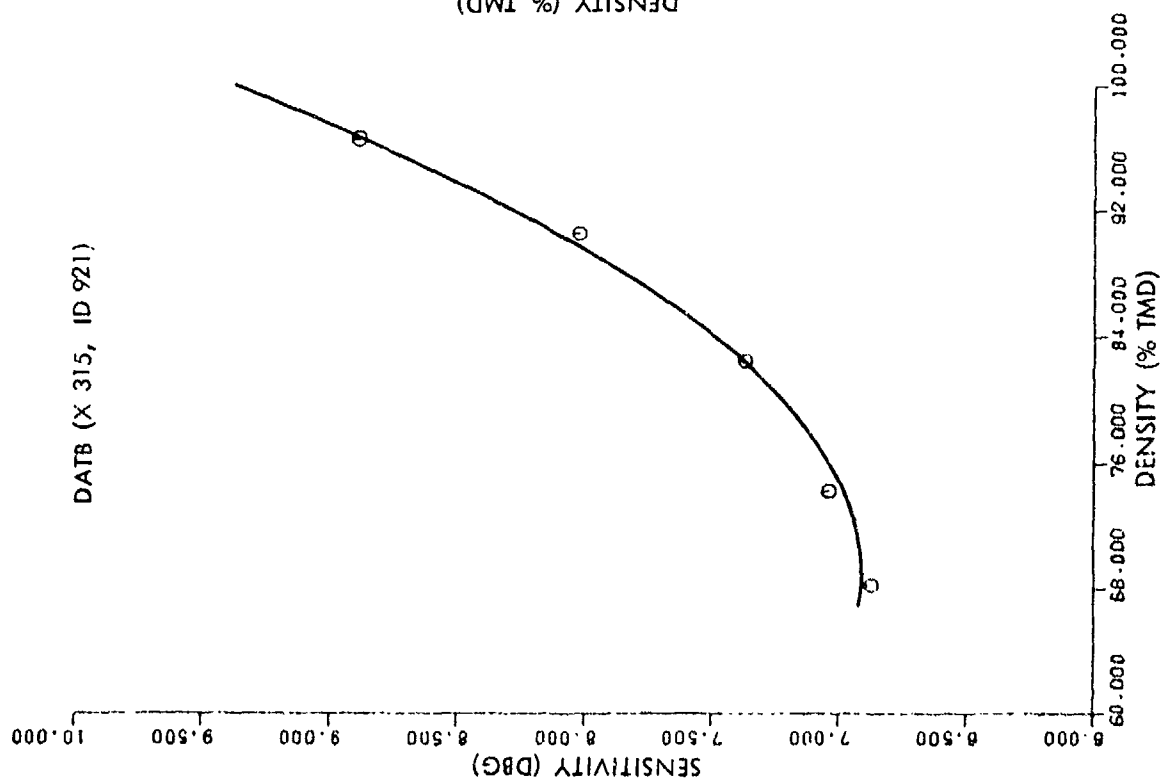
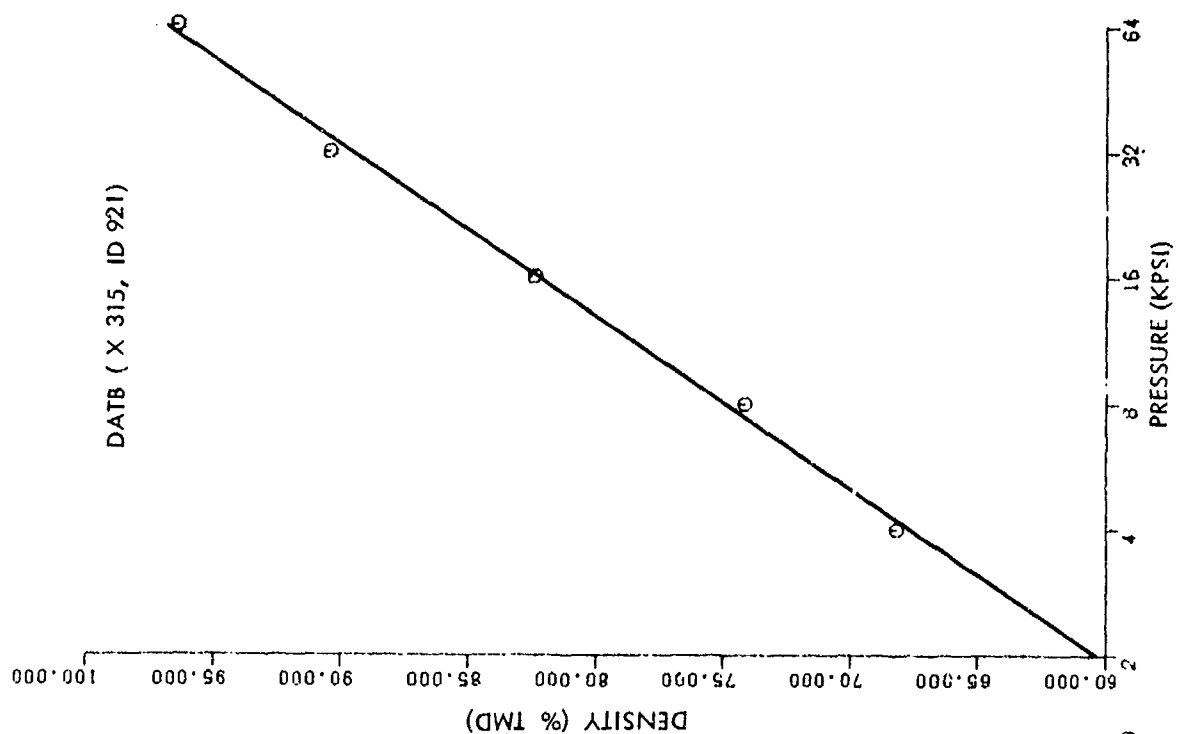
$\bar{x}$  =      cm

s =      log units

n =

Remarks  
\*600 pounds used to make  
DATB, ZYTEL



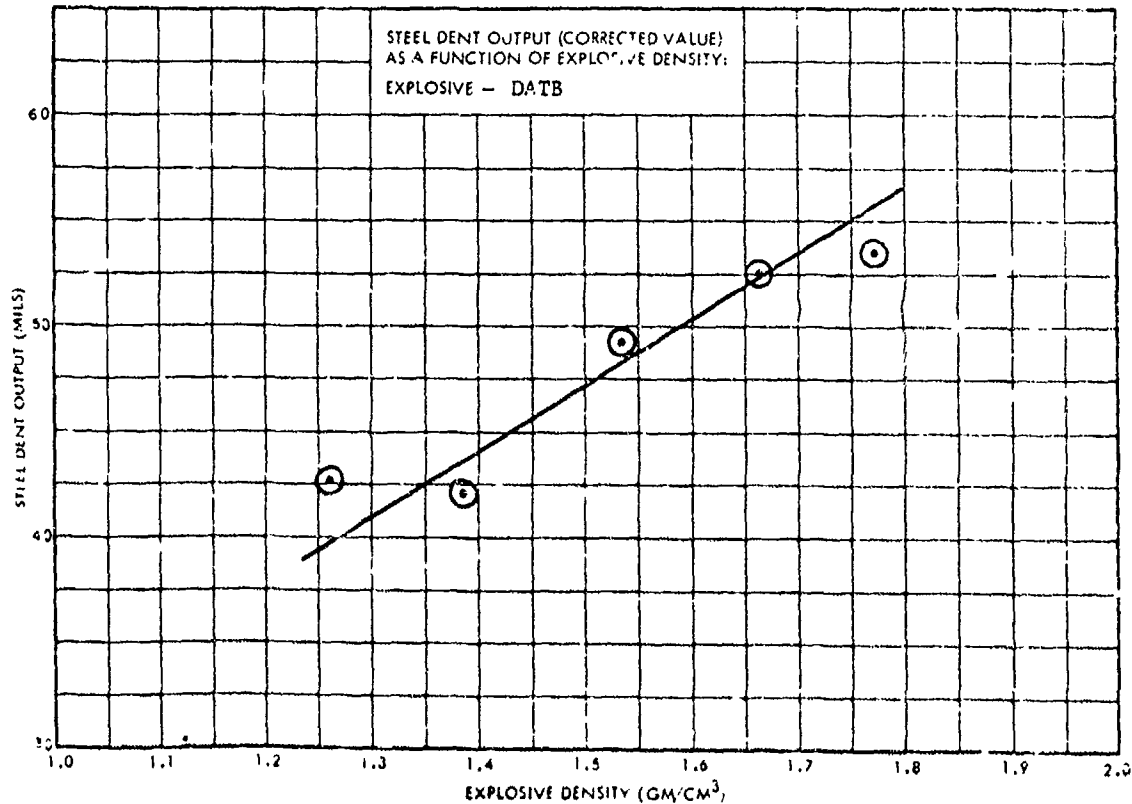


STEEL DENT OUTPUT DATA FOR DATB

|           |                         |           |     |
|-----------|-------------------------|-----------|-----|
| EXPLOSIVE | DATB                    | X NO.     | 315 |
| TMD       | 1.84 gm/cm <sup>3</sup> | I. D. NO. | 185 |

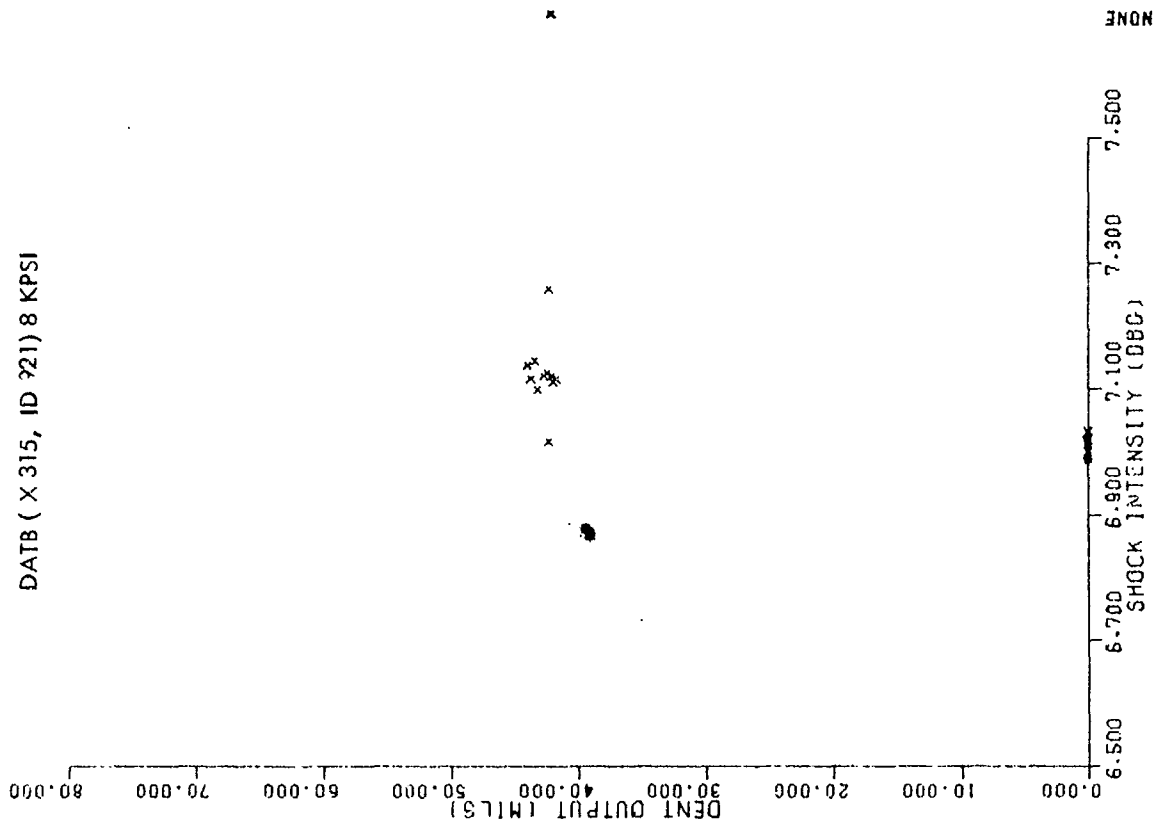
| LOADING PRESSURE<br>(PSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | GROUP I DATA                    |      |                                  |      | AVERAGE<br>GROUP I, II & III DATA |   |                                  |   | BLOCK<br>HARDNESS<br>DATA<br>(ROCKWELL B) |      |
|---------------------------|----------------------------------|--------|---------------------------------|------|----------------------------------|------|-----------------------------------|---|----------------------------------|---|---|------|
|                           |                                  |        | OBSERVED<br>DENT DATA<br>(MILS) |      | CORRECTED<br>DENT DATA<br>(MILS) |      | OBSERVED<br>DENT DATA<br>(MILS)   |   | CORRECTED<br>DENT DATA<br>(MILS) |   |   |      |
|                           |                                  |        |                                 |      |                                  |      |                                   |   |                                  |   |   |      |
|                           | AVG.                             | S      | AVG.                            | S    | AVG.                             | S    | AVG.                              | S | AVG.                             | S | AVG.                                      | S    |
| 4,000                     | 1.257                            | 0.0066 | 41.4                            | 1.57 | 42.6                             | 1.49 |                                   |   |                                  |   | 84.8                                      | 1.60 |
| 8,000                     | 1.384                            | 0.0028 | 40.3                            | 3.51 | 42.2                             | 3.44 |                                   |   |                                  |   | 85.7                                      | 1.55 |
| 16,000                    | 1.530                            | 0.0047 | 49.2                            | 2.54 | 49.4                             | 3.84 |                                   |   |                                  |   | 83.3                                      | 1.99 |
| 32,000                    | 1.663                            | 0.0024 | 50.9                            | 4.91 | 52.5                             | 6.43 |                                   |   |                                  |   | 85.4                                      | 2.88 |
| 64,000                    | 1.771                            | 0.0041 | 53.2                            | 2.20 | 53.7                             | 2.31 |                                   |   |                                  |   | 83.7                                      | 1.72 |
|                           |                                  |        |                                 |      |                                  |      |                                   |   |                                  |   |   |      |

NOTES:

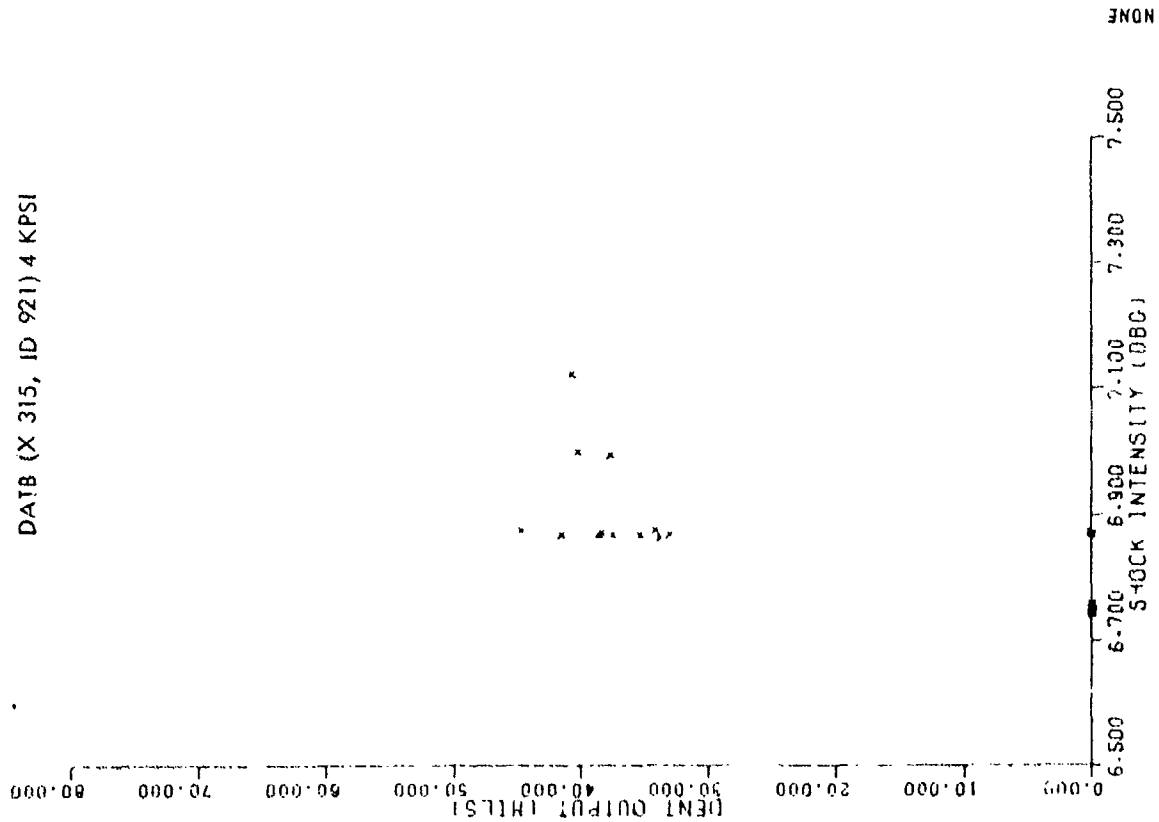


# NOLTR 73-132

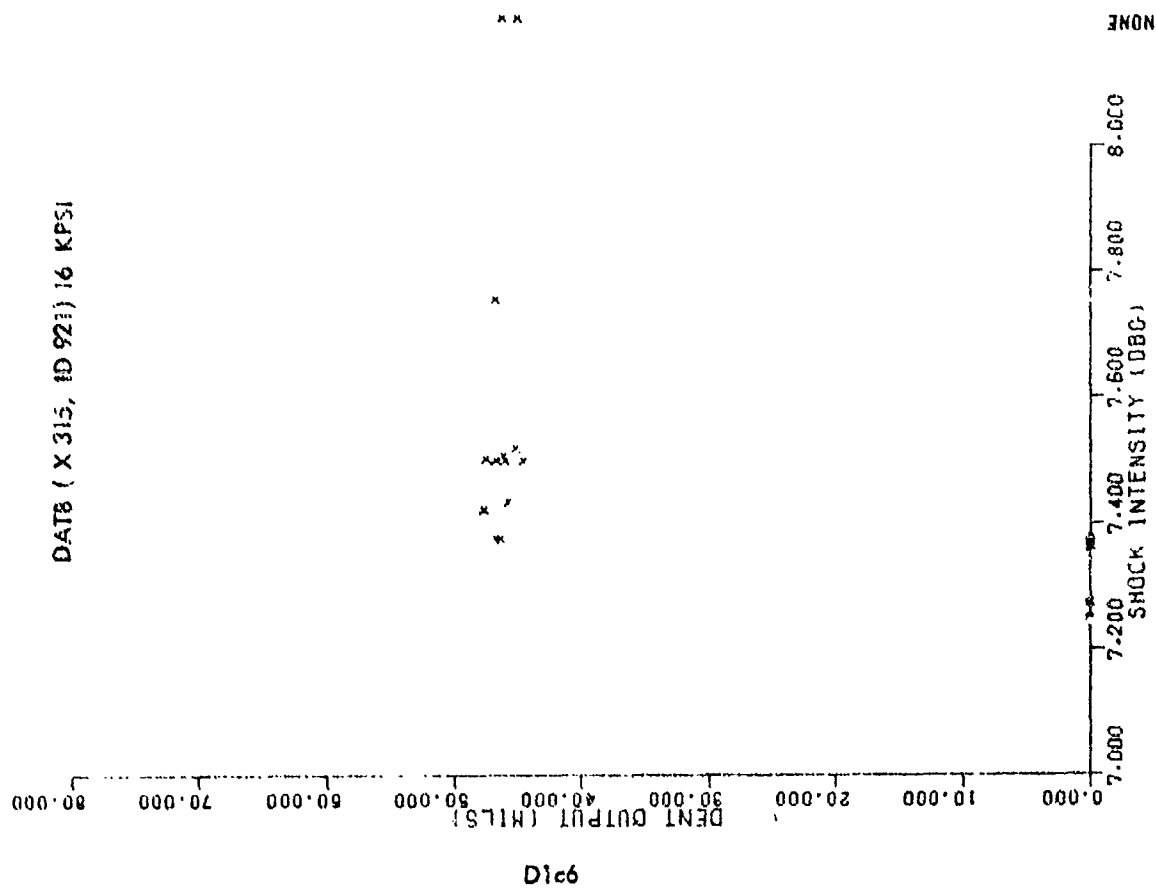
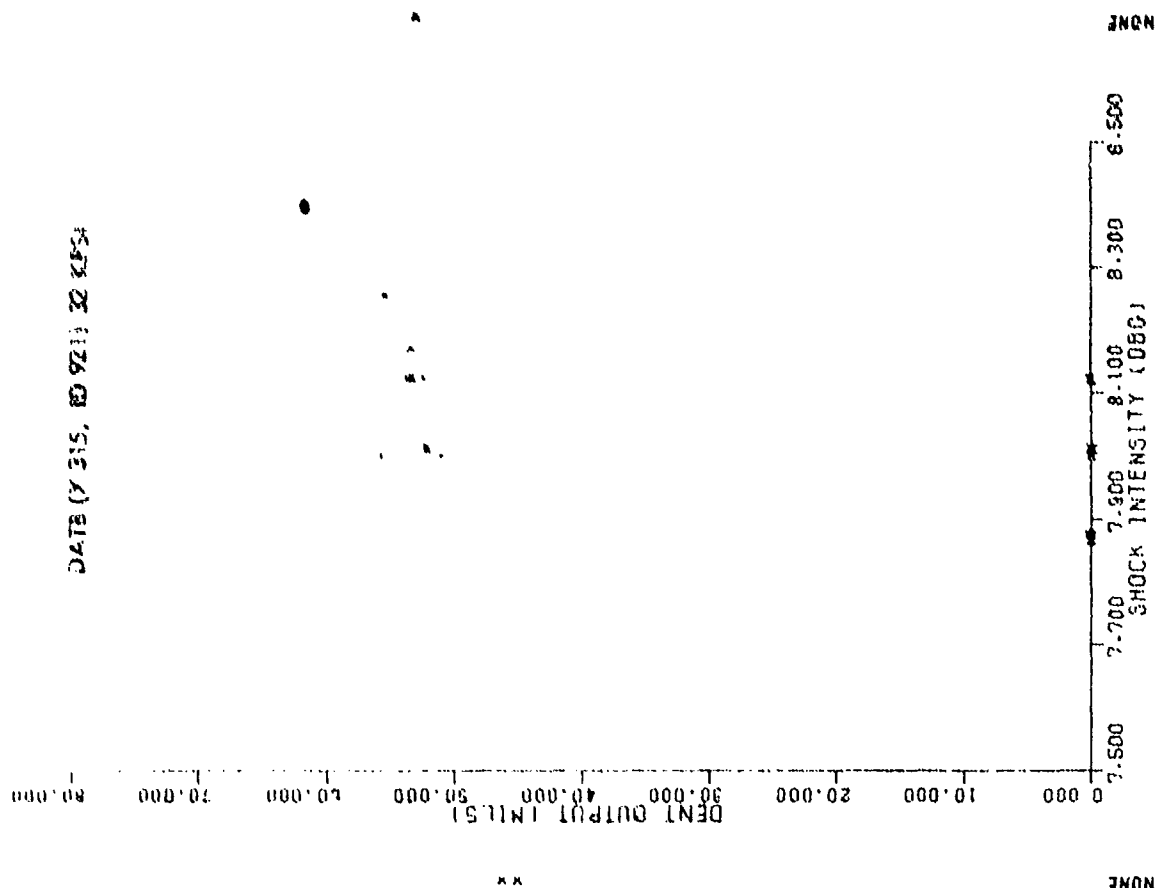
DATB (X 315, ID 921) 8 KPSI



DATB (X 315, ID 921) 4 KPSI

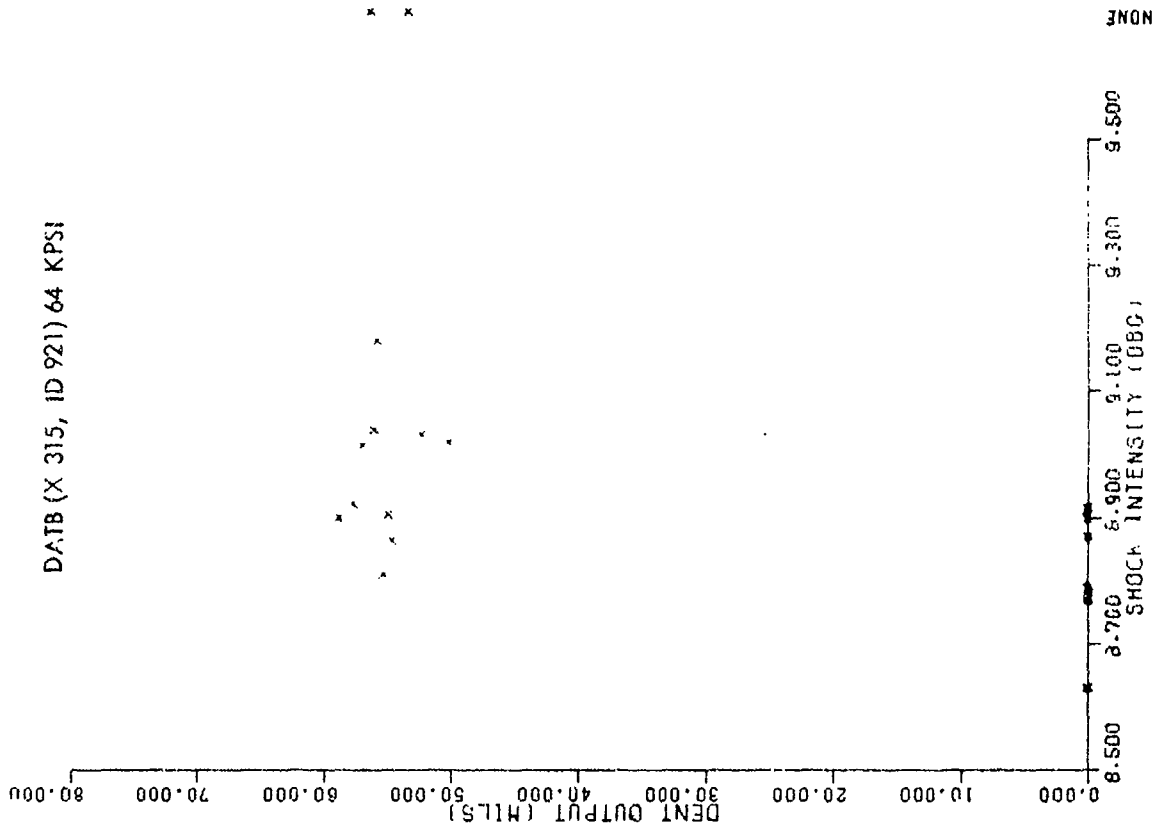


NO. 73-132



D1c6

NOLTR 73-132



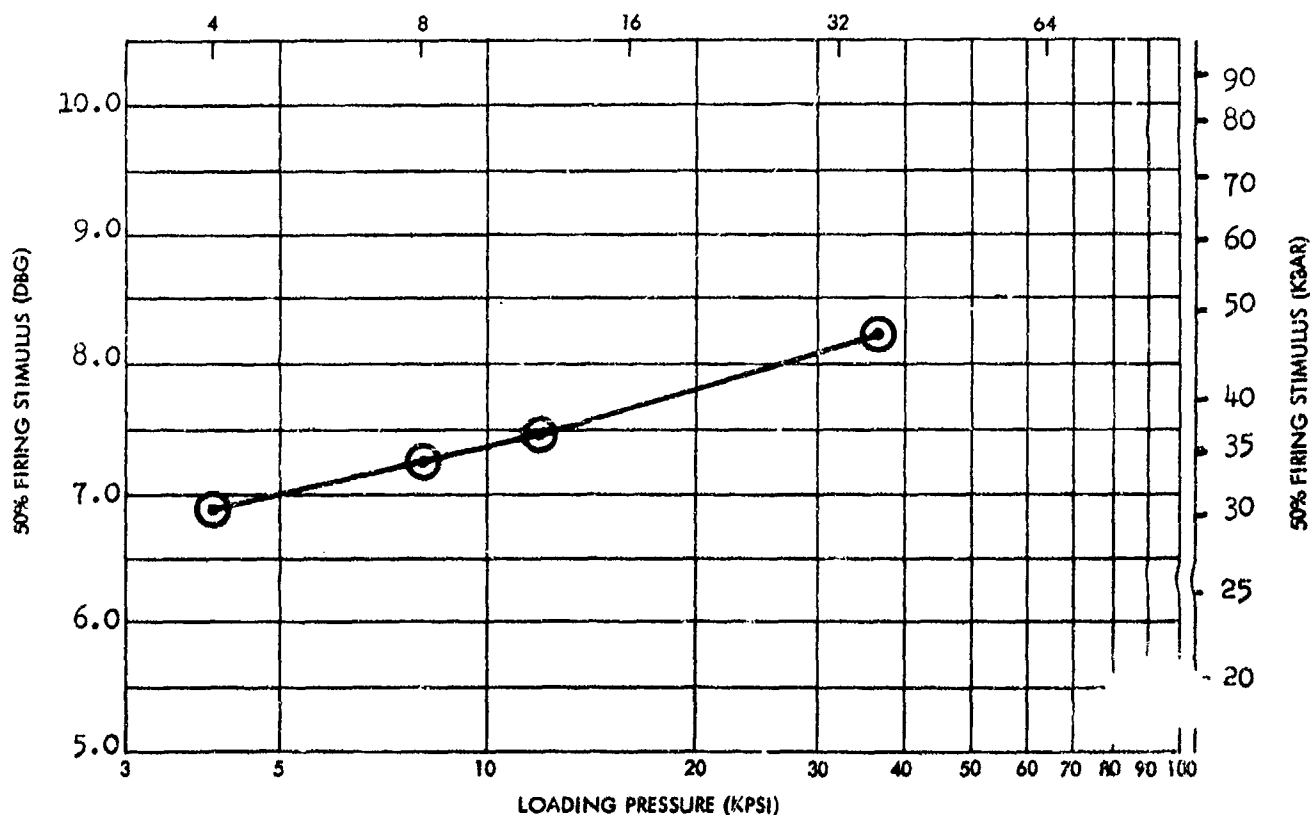
D1c7/D1c8

NOLTR 73-132

|           |      |           |     |              |
|-----------|------|-----------|-----|--------------|
| EXPLOSIVE | DATB | X NO.     | 331 | Date of Test |
| TMD       | 1.84 | I. D. NO. | -   | 12/64        |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4.08                    | 1.231                         | 0.0088 | 66.9  | 6.889             | 0.0879 | 0.0493         | 20 |         |
| 8                       | 1.339                         | 0.0108 | 72.8  | 7.240             | 0.0012 | 0.0014         | 20 | (1)     |
| 17.50                   | 1.442                         | 0.0039 | 78.4  | 7.476             | 0.0254 | 0.0226         | 20 |         |
| 37.00                   | 1.701                         | 0.0065 | 92.4  | 8.236             | 0.1074 | 0.0605         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of Test - 2/65



SMALL SCALE GAP TEST (SSGT) DATA  
DATB

Dld1

4 Sep 1973



NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: DATE

X NO.: 331 ID: Z NO.: - SSGT LOAD ORDER NO.: 998 &  
1015

SOURCE:

CHEMICAL NAME: 1,3 - Diamino-2,4,6 - trinitrobenzene

DATE RECEIVED: 2/27/61 LOT NO.: HOL SR 4-61

INITIAL QUANTITY: 150 pounds BATCH NO.: 86-328-2

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

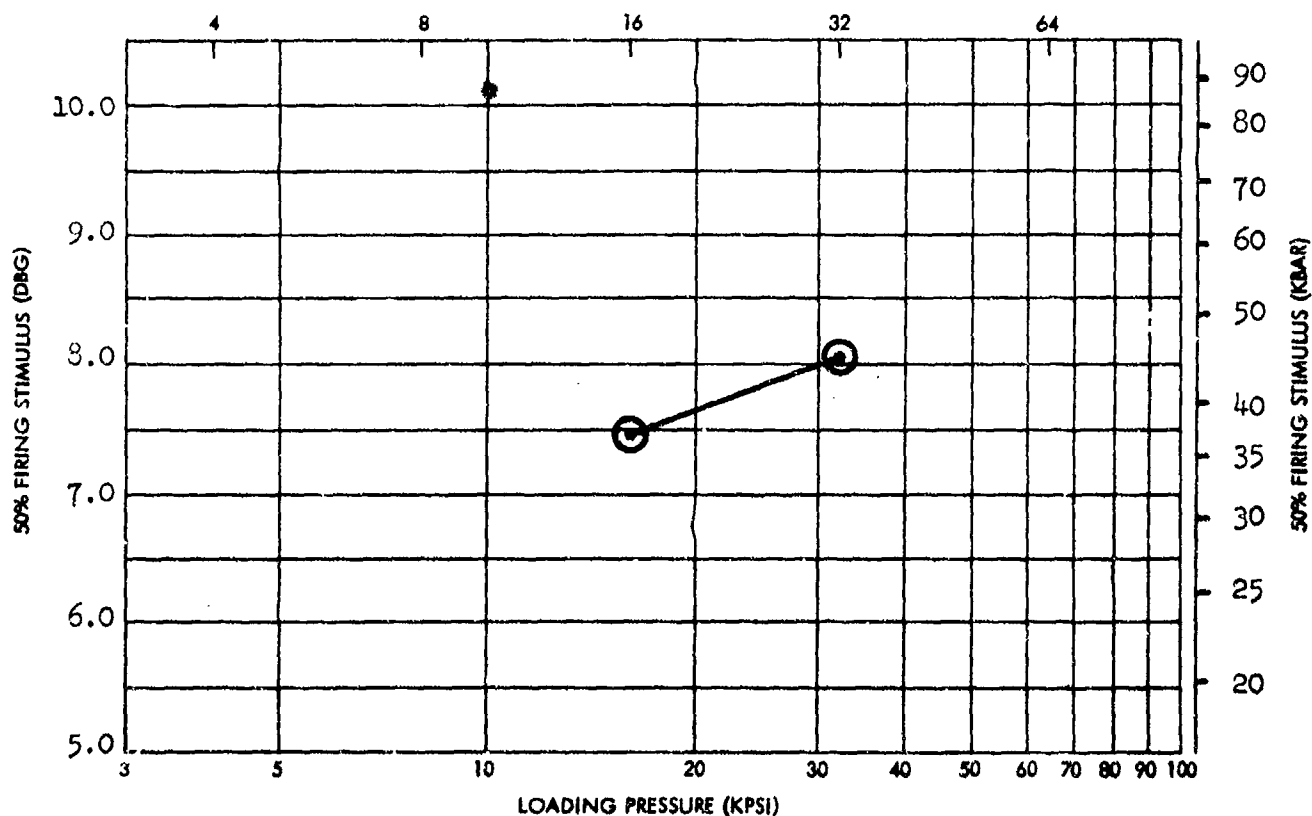
Remarks

Average particle size 8 $\mu$

NOLTR 73-132

|           |      |           |     |              |
|-----------|------|-----------|-----|--------------|
| EXPLOSIVE | DATB | X NO.     | 331 | Date of Test |
| TMD       | 1.84 | I. D. NO. | 920 | 11/67        |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 16                      | 1.514                         | 0.0048 | 82.3  | 7.477             | 0.0671 | 0.0378         | 20 |         |
| 3                       | 1.662                         | 0.0054 | 90.3  | 8.049             | 0.1165 | 0.0597         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
DATB

D1e1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME:           DATB          

X NO.: 331    ID: 920    Z NO.:            SSGT LOAD ORDER NO.: 1209

SOURCE:

CHEMICAL NAME: 1,3 - Diamino-2,4,6 - trinitrobenzene

DATE RECEIVED: 2/27/61

LOT NO.: HOL SR 4-61

INITIAL QUANTITY: 150 pounds

BATCH NO.: 86-328-2

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ =            cm

s =            log units

n =

Remarks

Average particle size 8 $\mu$ .

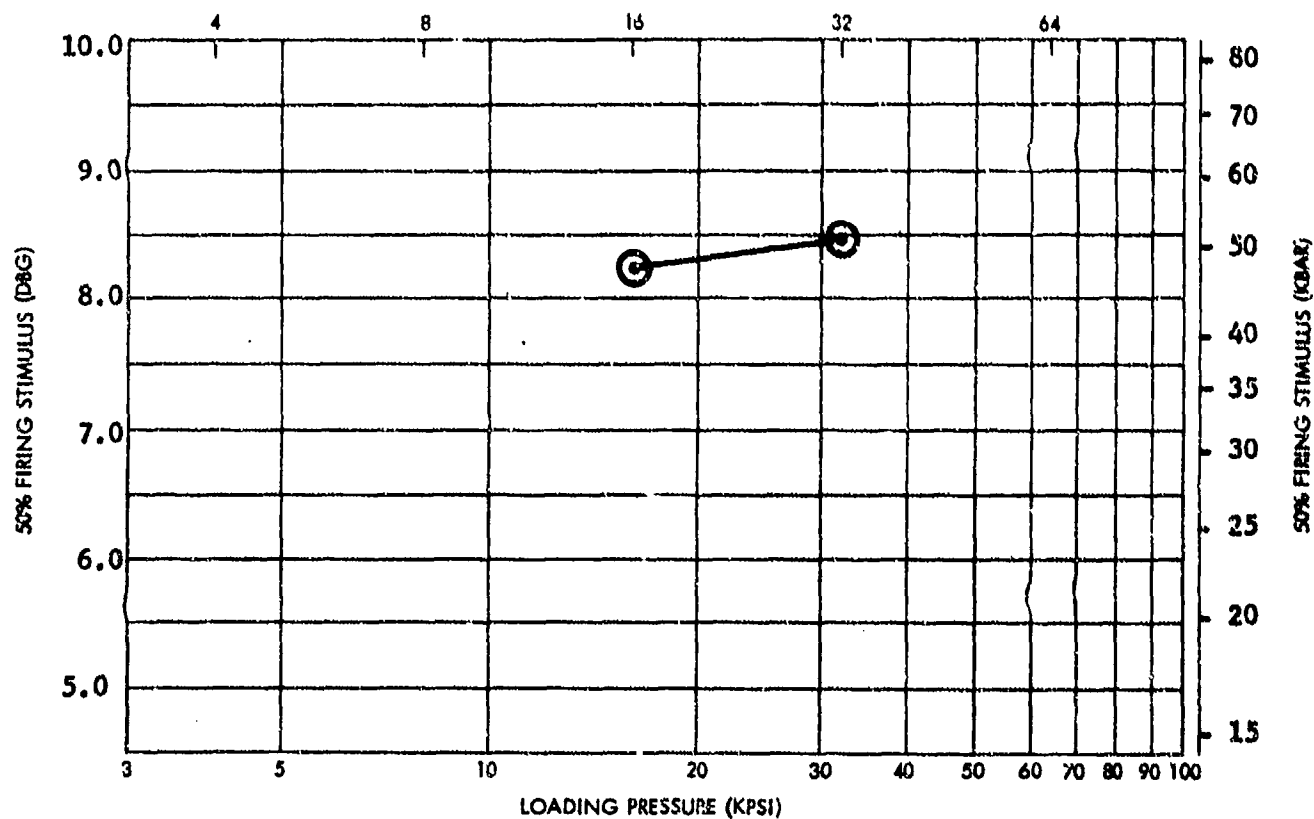
NOLTR 73-132

EXPLOSIVE DATB  
TMD 1.84

X NO. 397  
I. D. NO. 922

Date of Test  
9/68

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (D&G) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | U      | U <sub>M</sub> | N  |         |
| 16                            | 1.655                            | 0.0039 | 89.9  | 8.227             | 0.0610 | 0.0361         | 20 |         |
| 32                            | 1.738                            | 0.0029 | 94.5  | 8.486             | 0.0017 | 0.0004         | 20 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



D1f1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: \_\_\_\_\_ DATE \_\_\_\_\_

X NO.: 397 ID: 922 E NO.: SSGT LOAD ORDER NO.: 1210

SOURCE:

CHEMICAL NAME: 1,3 - Diamino-2,4,6 - trinitrobenzene

DATE RECEIVED: 6/29/62

LOT NO.: HOL SR-228-61

INITIAL QUANTITY: 105 pounds  
(\$3028)

BATCH NO.: 86-425\*

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (# or 500 point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

E = cm

S = log units

H =

Remarks

\*Special 300µ needles

100 Gram Sieve Analysis, 1 Hour\*\*

| Mesh Size |     | Amount<br>(g) |
|-----------|-----|---------------|
| Through   | On  |               |
|           | 40  | 6.0           |
| 40        | 60  | 16.0          |
| 60        | 100 | 32.8          |
| 100       | 170 | 30.7          |
| 170       | 270 | 10.2          |
| 270       | 325 | 2.8           |
| 325       | PAN | 1.5           |

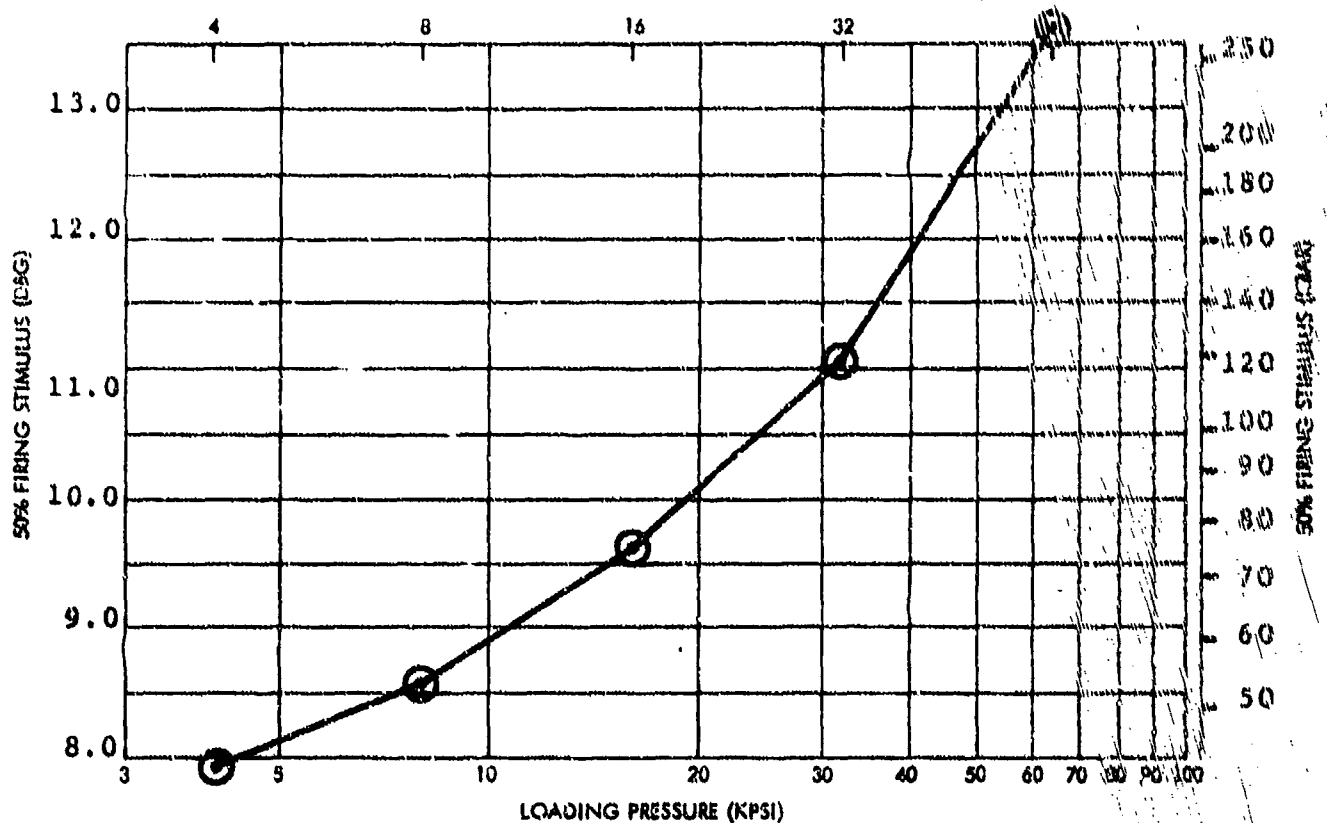
(8/13/62)

\*\*Assumed that this notation  
indicates sieve time.

|           |      |           |     |                      |
|-----------|------|-----------|-----|----------------------|
| EXPLOSIVE | TATB | X NO.     | 335 | PAGE OF PAGE<br>4/62 |
| TMD       | 1.93 | I. D. NO. | "   |                      |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |       | % TMD | SENSITIVITY (DBS) |        |                |    | REMARKS |
|-------------------------|-------------------------------|-------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s     |       | AVG.              | s      | s <sub>m</sub> | N  |         |
| 4                       | 1.519                         | 0.010 | 78.7  | 7.918             | 0.0291 | 0.0316         | 20 | (1)     |
| 8                       | 1.645                         | 0.008 | 85.2  | 8.573             | 0.0657 | 0.0390         | 20 | (1)     |
| 16                      | 1.762                         | 0.005 | 91.3  | 9.626             | 0.0596 | 0.0358         | 20 | (1)     |
| 32                      | 1.840                         | 0.003 | 95.3  | 11.091            | 0.0599 | 0.0415         | 20 | (1)     |
| 64                      | 1.887                         | 0.004 | 97.8  | 13.604            | 0.2150 | 0.1277         | 20 | (1)     |

(1) Material loaded under vacuum.



SMALL SCALE GAP TEST (SSGT) DATA  
TATB

D2a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TATB

X NO.: 335 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: 1,3,5 - Triamino-2,4,6 - trinitrobenzene

DATE RECEIVED: 4/20/61

LOT NO.: \*

INITIAL QUANTITY: 252 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WC/ED Divisions  
(F. Taylor, C. Randall)

IMPACT SENSITIVITY (1/2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

1/2 = cm

s = log units

n =

Remarks

\*Lot No. 16-6113 mixed  
42-6113

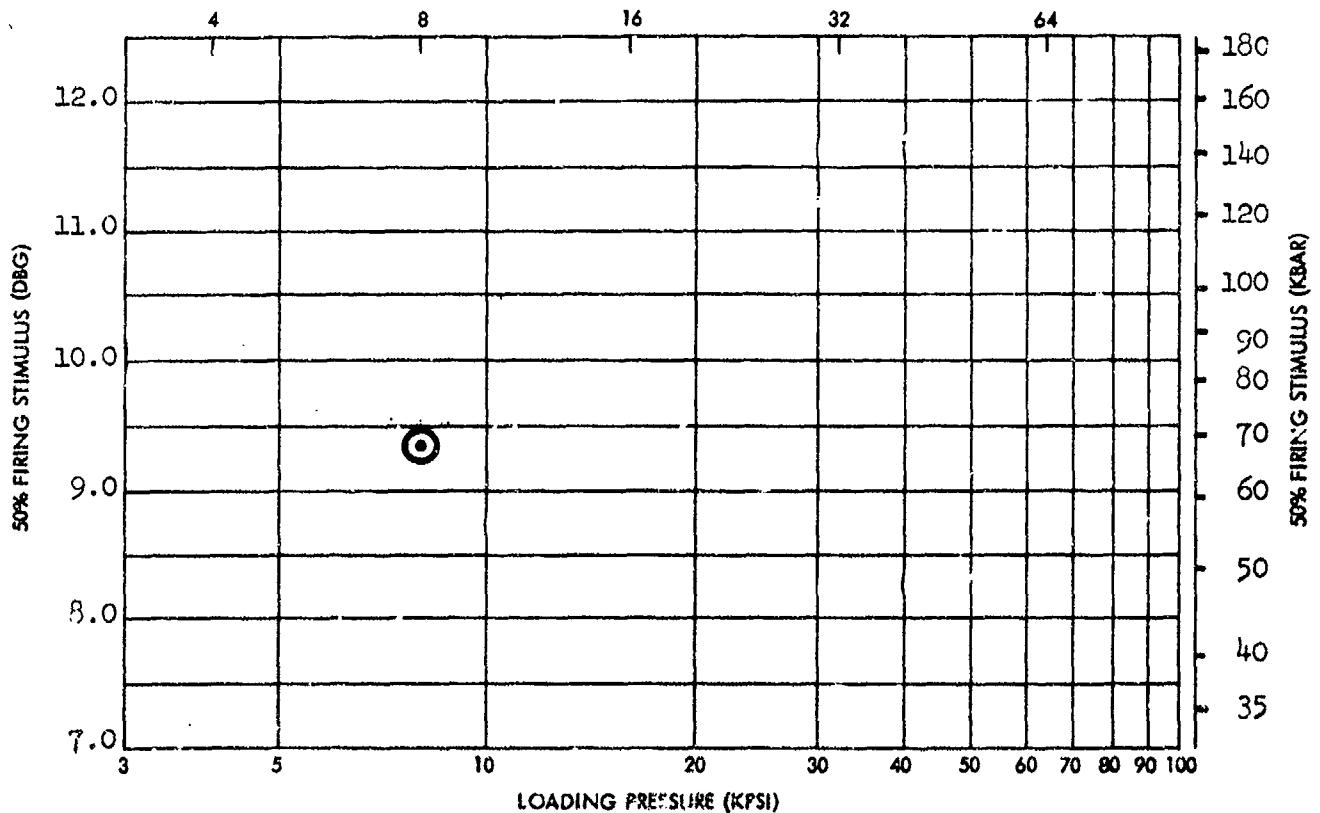
NOLTR 73-132

|           |      |           |     |
|-----------|------|-----------|-----|
| EXPLOSIVE | TATB | X NO.     | 406 |
| TMD       | 1.93 | I. D. NO. | -   |

Date of Test  
2/63

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |   |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|---|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g | s <sub>m</sub> | N  |         |
| 8                       | 1.727                         | 0.0025 | 89.5  | 9.352             | - | -              | 20 | (1)     |
|                         |                               |        |       |                   |   |                |    |         |
|                         |                               |        |       |                   |   |                |    |         |
|                         |                               |        |       |                   |   |                |    |         |
|                         |                               |        |       |                   |   |                |    |         |
|                         |                               |        |       |                   |   |                |    |         |
|                         |                               |        |       |                   |   |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
TATB

D2b1

4 Sep 1973



NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TATB

X NO.: 406 ID: Z NO.: SSGT LOAD ORDER NO.: 1012

SOURCE:

CHEMICAL NAME: 1,3,5 - Triamino-2,4,6 - trinitrobenzene

DATE RECEIVED: 9/62

LOT NO.:

INITIAL QUANTITY: 200 pounds

BATCH NO.:

MANUFACTURED BY:  
American Cyanamide  
New Castle, Penn.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

Remarks

D 2 b 2

4 Sep 1973

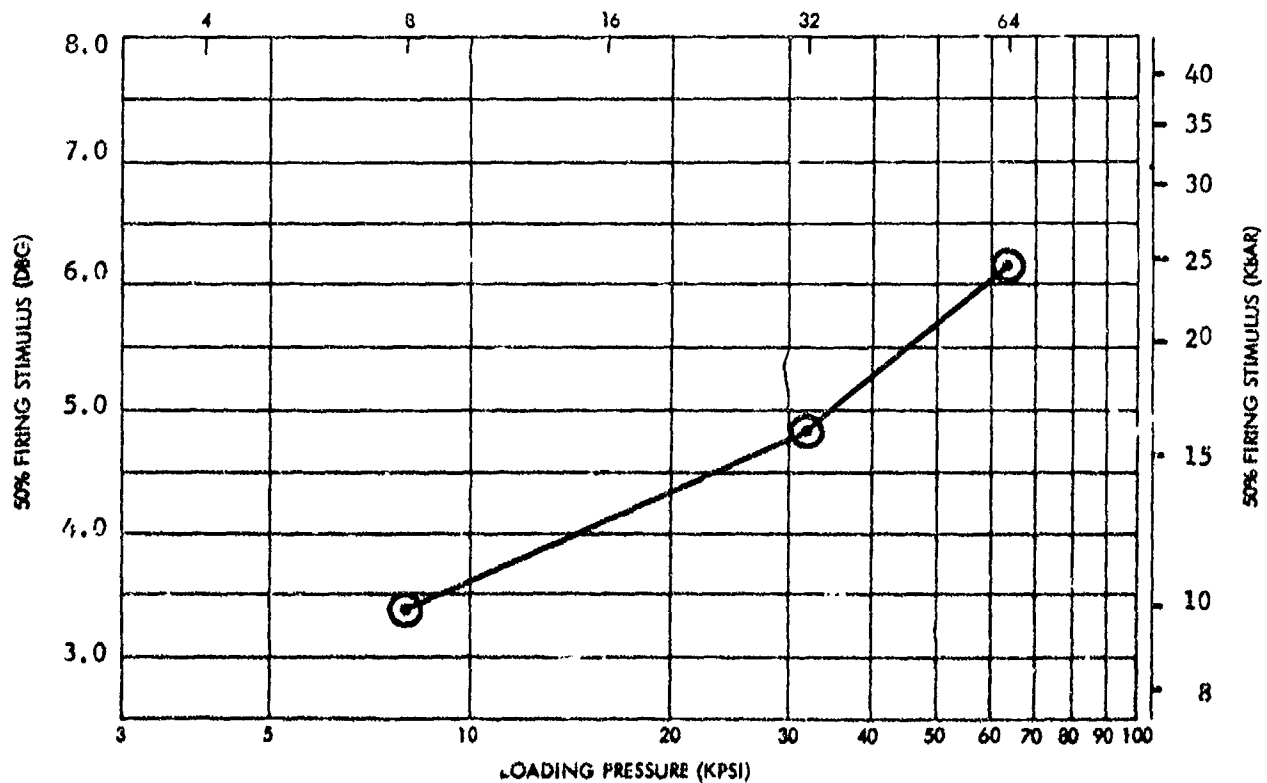
NOLTR 73-132

EXPLOSIVE HNAB  
TMD -

X NO. 511, 512  
I. D. NO. -

Date of Test  
3/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                             | 1.476                            | 0.0060 | -     | 3.486             | 0.0142 | 0.0348         | 18 |         |
| 32                            | 1.671                            | 0.0051 | -     | 4.848             | 0.0189 | 0.0318         | 12 |         |
| 64                            | 1.766                            | 0.0059 | -     | 6.182             | 0.0611 | 0.0363         | 18 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
HNAB

D3a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNAB\*

X NO.: 511,512ID:                      Z NO.: 606                      SSGT LOAD ORDER NO.: 1023 -  
1024

SOURCE: Lockheed Missile & Space Company  
Santa Cruz Test Base

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitroazobenzene

DATE RECEIVED: 12/9/64                      LOT NO.:

INITIAL QUANTITY: 1/2 pound each                      BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST 4/9/65

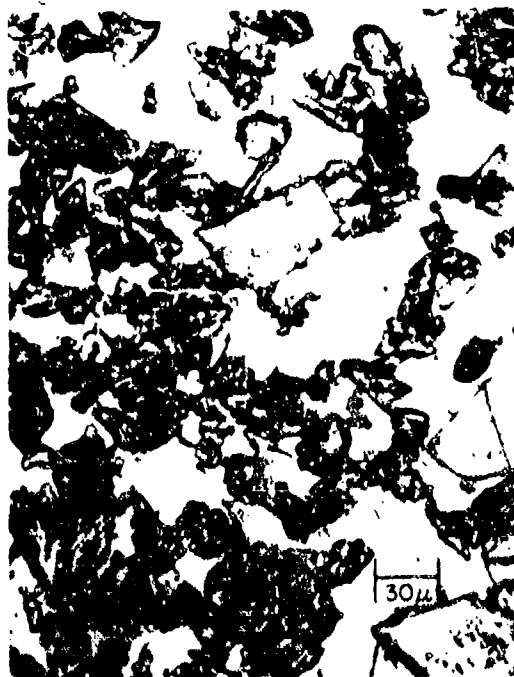
§ = 32 cm

s = 0.19 log units

n = 25

Remarks

\*Data papers in sample box:  
"HNAB, coarse grad, lab  
sample under alcohol,  
X511 - Lot X-7  
X512 - Lot X-6."



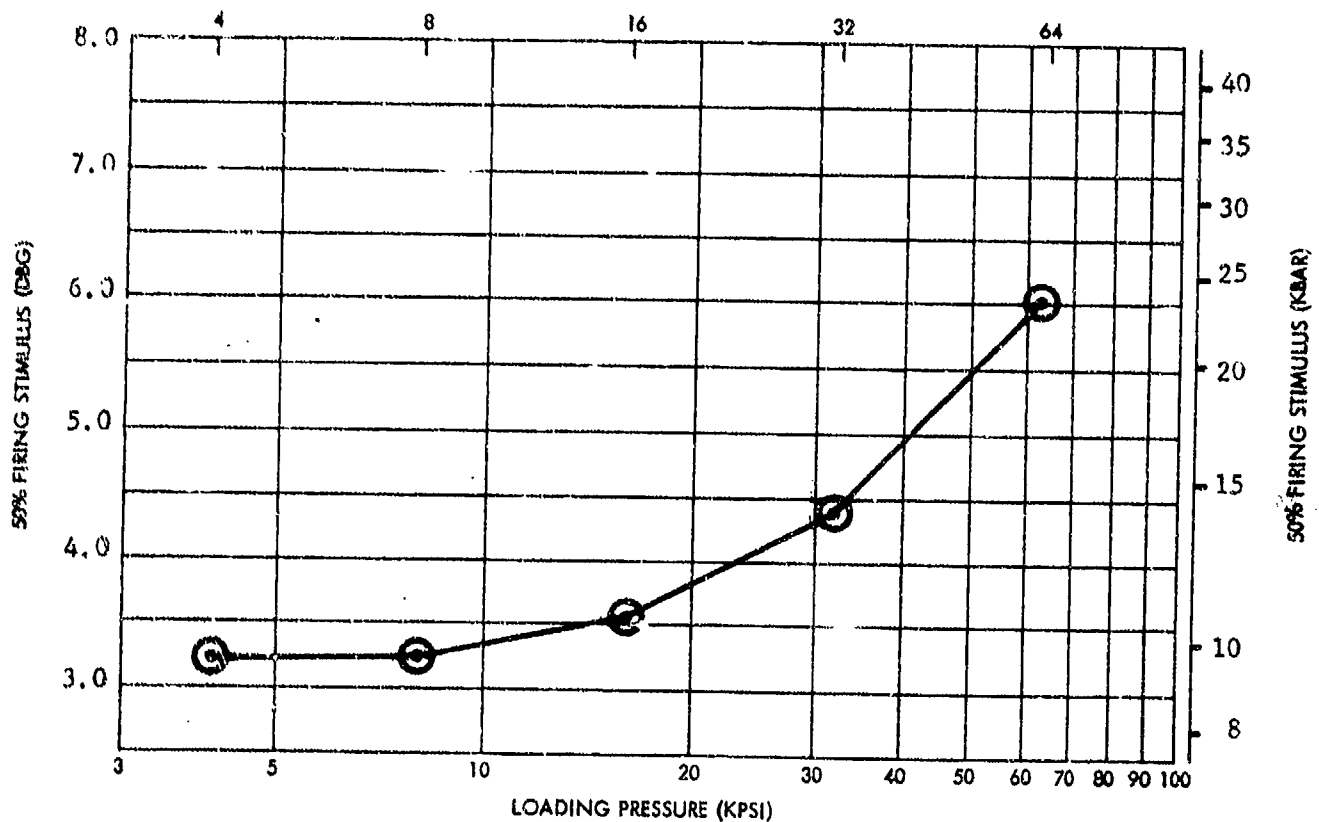
EXPLOSIVE HNAB  
YMD ---

X NO. 518 (2)  
I. D. NO. -

Date of Test  
3/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % YMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | D      | s <sub>m</sub> | N  |         |
| 4                       | 1.383                         | 0.0066 | -     | 3.244             | 0.0051 | 0.0034         | 23 |         |
| 8                       | 1.480                         | 0.0039 | -     | 3.251             | -      | -              | 23 | (1)     |
| 16                      | 1.582                         | 0.0133 | -     | 3.549             | 0.0554 | 0.0304         | 23 |         |
| 32                      | 1.687                         | 0.0030 | -     | 4.382             | 0.0574 | 0.0502         | 23 |         |
| 64                      | 1.774                         | 0.0054 | -     | 6.003             | 0.0512 | 0.0292         | 23 |         |
|                         |                               |        |       |                   |        |                |    |         |

- (1) No mixed response zone  
(2) HNAB, XNO 518, EDW Grade.



SMALL SCALE GAP TEST (SSGT) DATA  
HNAB

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNAB (EBW Grade)\*

X NO.: 518 ID: Z NO.: 634 SSGT LOAD ORDER NO.: 1017-1021

SOURCE: Lockheed Missile & Space Company, Santa Cruz Test Base  
NOW 63-0050-C

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitroazobenzene

DATE RECEIVED: 3/19/65 LOT NO.: 8

INITIAL QUANTITY: 1/2 pound BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (1/2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

s = cm

s = log units

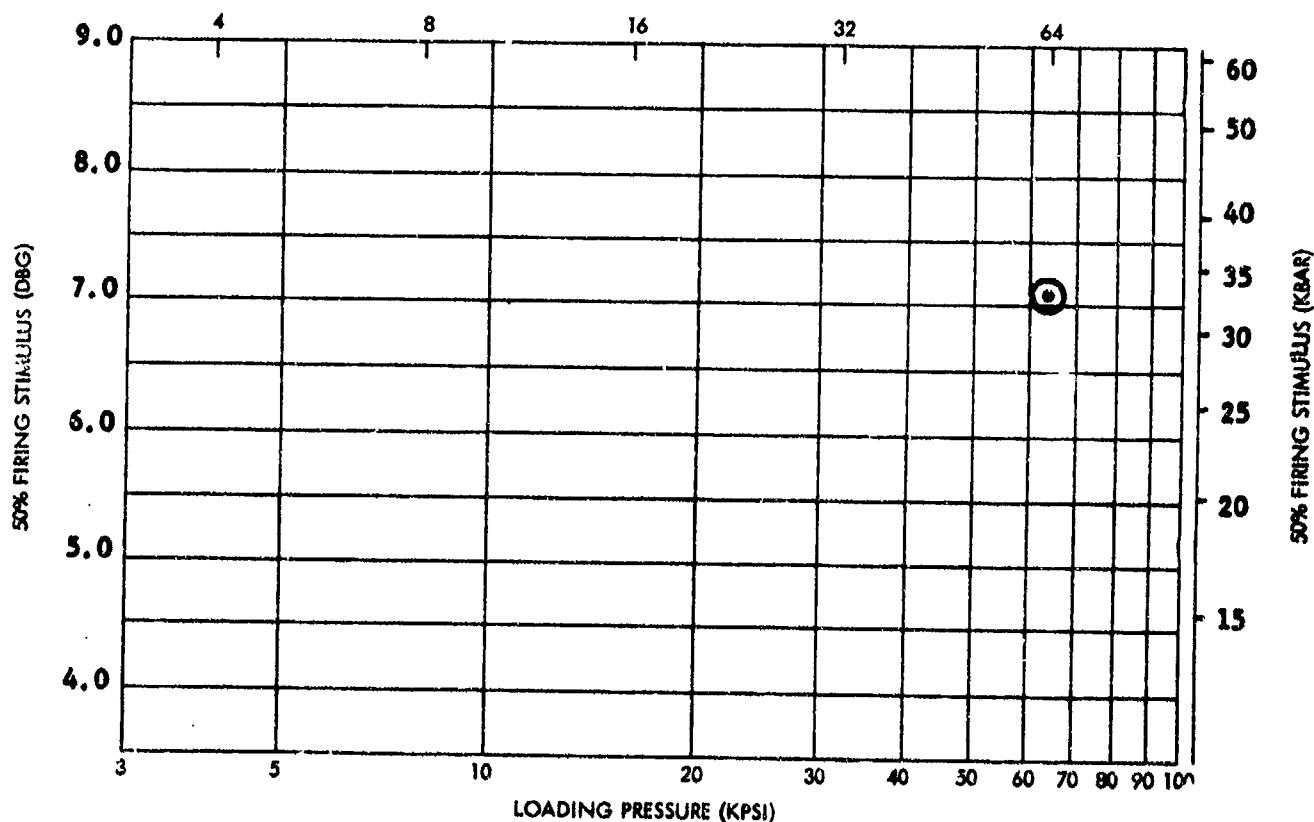
n =

Remarks

\*Under Ethanol - water

EXPLOSIVE **DIPAM**X NO. **346**TMD **1.79**I. D. NO. **-**Date of Test  
**9/62**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |               | % TMD       | SENSITIVITY (DBG) |              |                |           | REMARKS |
|-------------------------------|----------------------------------|---------------|-------------|-------------------|--------------|----------------|-----------|---------|
|                               | AVG.                             | s             |             | AVG.              | g            | s <sub>m</sub> | N         |         |
| <b>64</b>                     | <b>1.750</b>                     | <b>0.0128</b> | <b>97.8</b> | <b>7.061</b>      | <b>.1255</b> | <b>0.0625</b>  | <b>23</b> |         |
|                               |                                  |               |             |                   |              |                |           |         |
|                               |                                  |               |             |                   |              |                |           |         |
|                               |                                  |               |             |                   |              |                |           |         |
|                               |                                  |               |             |                   |              |                |           |         |
|                               |                                  |               |             |                   |              |                |           |         |

SMALL SCALE GAP TEST (SSGT) DATA  
DIPAM

D4a1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: DIPAM

X NO.: 346      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: 3,3' - Diamino-2,2',4,4',6,6' - hexanitrobiphenyl  
NOL Notebook

DATE RECEIVED: 1/31/62

LOT NO.: 96-5872-pg 81 Item 3

INITIAL QUANTITY: 300 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WO Division  
(Dr. M. Kamlet)

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

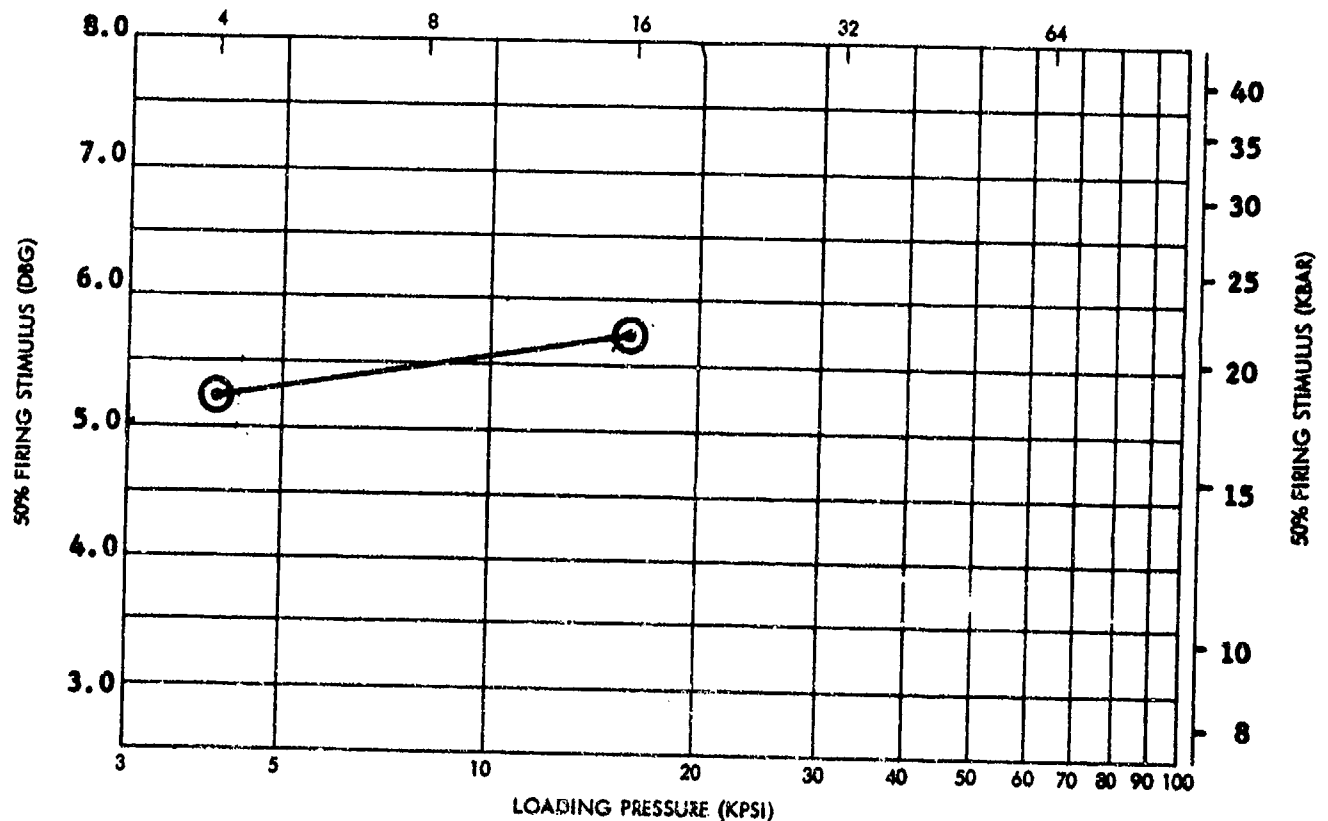
s = log units

n =

Remarks

EXPLOSIVE **DIPAM**X NO. **402**TMD **1.79**I. D. NO. **"**Date of Test  
**9/62**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |               | % TMD       | SENSITIVITY (DBG) |               |                |           | REMARKS |
|-------------------------------|----------------------------------|---------------|-------------|-------------------|---------------|----------------|-----------|---------|
|                               | AVG.                             | s             |             | AVG.              | g             | s <sub>m</sub> | N         |         |
| <b>4</b>                      | <b>1.216</b>                     | <b>0.0077</b> | <b>67.9</b> | <b>5.233</b>      | <b>0.0485</b> | <b>0.0281</b>  | <b>23</b> |         |
| <b>16</b>                     | <b>1.461</b>                     | <b>0.0073</b> | <b>81.6</b> | <b>5.730</b>      | <b>0.0168</b> | <b>0.0150</b>  | <b>23</b> |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |

SMALL SCALE GAP TEST (SSGT) DATA  
DIPAM

D4b1

4 Sep 1973



NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DIPAM

X NO.: 402

ID:

Z NO.: 429

SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: 3,3' - Diamino-2,2',4,4',6,6' - hexanitrobiphenyl

DATE RECEIVED: 8/1/62

LOT NO.:

INITIAL QUANTITY: 3 pounds

BATCH NO.:

MANUFACTURED BY:  
NOL: WO Division

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

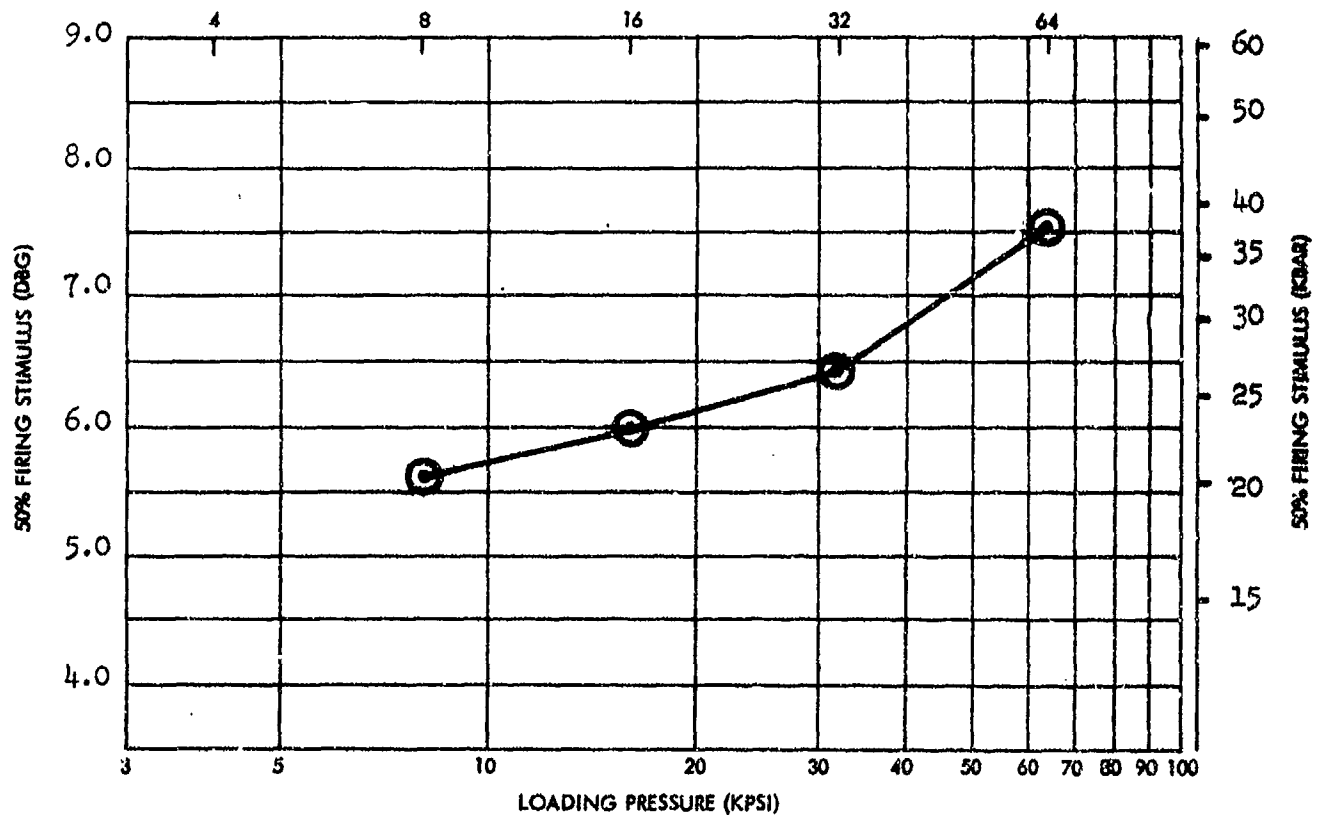
Remarks

EXPLOSIVE DIPAM  
TMD 1.79

X NO. 428  
I. D. NO. -

Date of Test  
5/63

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.307                         | 0.0553 | 73.0  | 5.619             | 0.0788 | 0.0394         | 23 |         |
| 16                      | 1.478                         | 0.0228 | 82.6  | 5.988             | 0.0208 | 0.0132         | 23 |         |
| 32                      | 1.627                         | 0.0230 | 90.9  | 6.424             | 0.0365 | 0.0234         | 23 |         |
| 64                      | 1.784                         | 0.0037 | 99.7  | 7.539             | 0.0808 | 0.0419         | 23 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
DIPAM

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DIPAN

X NO.: 428 ID: X NO.: 475 SSGT LOAD ORDER NO.: 1033

SOURCE:

CHEMICAL NAME: 3,3' - Diamino-2,2',4,4',6,6' - hexanitrobiphenyl

DATE RECEIVED: 7/18/63

LOT NO.: 251-65-1A-2A

INITIAL QUANTITY: 1 pound

BATCH NO.:

MANUFACTURED BY:  
American Cyanamide  
New Castle, Penn.

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

K = 95 cm

s = 0.11 log units

n = 50

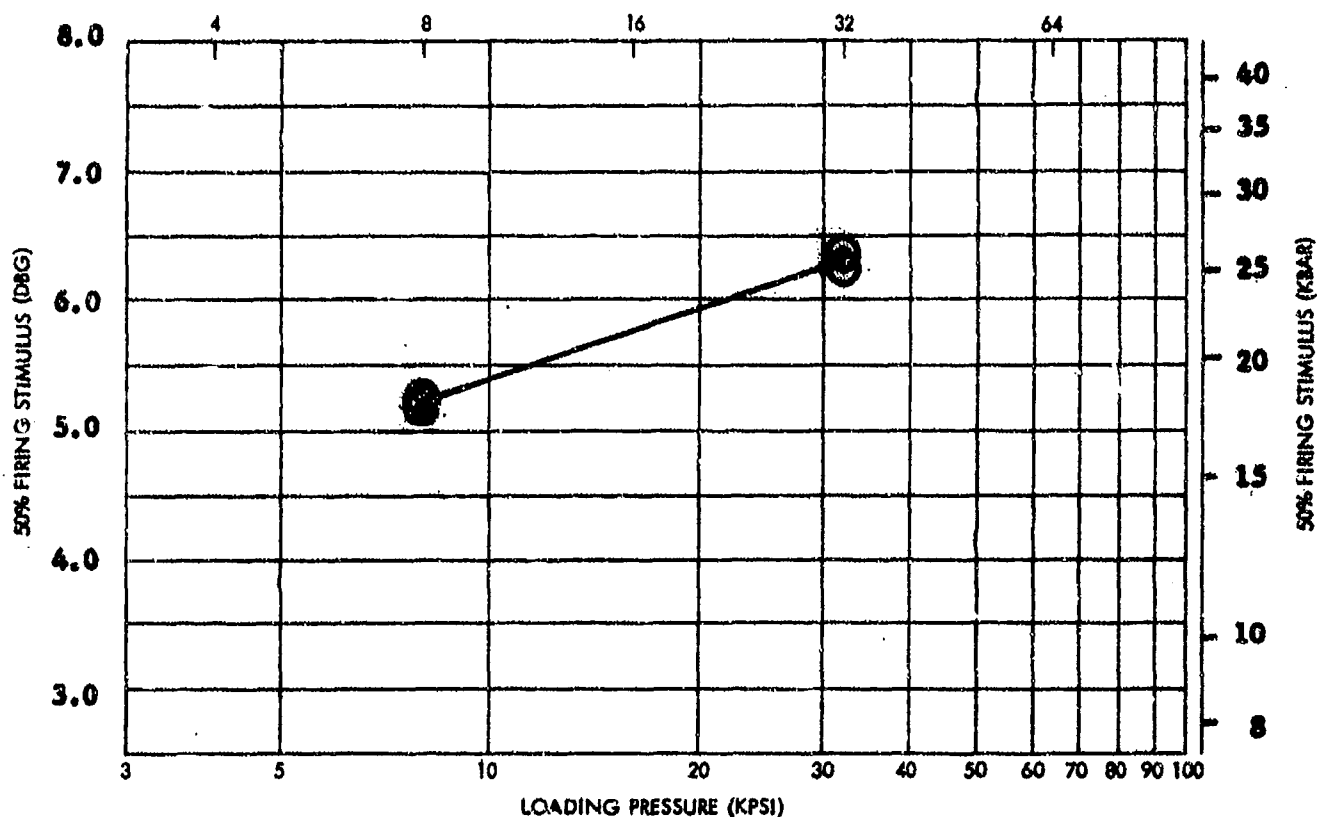
Remarks

EXPLOSIVE DIPAM  
TMD 1.79

X NO. 352, 453  
I. D. NO. "

Date of Test  
6/64

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (D8G) |        |                |    | REMARKS   |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|-----------|
|                               | AVG.                             | s      |       | AVG.              | 0      | s <sub>m</sub> | N  |           |
| 8                             | 1.356                            | 0.0257 | 75.8  | 5.121             | 0.0435 | 0.041          | 20 | X No. 452 |
| 32                            | 1.674                            | 0.0053 | 93.3  | 6.236             | 0.0338 | 0.0228         | 20 | X No. 452 |
| 8                             | 1.394                            | 0.0362 | 77.9  | 5.256             | 0.0757 | 0.0446         | 20 | X No. 453 |
| 32                            | 1.662                            | 0.0055 | 92.8  | 6.358             | 0.0136 | 0.0216         | 20 | X No. 453 |
|                               |                                  |        |       |                   |        |                |    |           |
|                               |                                  |        |       |                   |        |                |    |           |



SMALL SCALE GAP TEST (SSGT) DATA  
DIPAM

D4d1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DIPAM

X NO.: 452 ID: Z NO.: SSGT LOAD ORDER NO.: 973

SOURCE:

CHEMICAL NAME: 3,3' - Diamino-2,2',4,4',6,6' - hexanitrobiphenyl  
NOL Notebook

DATE RECEIVED: LOT NO.: 96-6894 pg 87 pg 92

INITIAL QUANTITY: 270 grams BATCH NO.:

MANUFACTURED BY:

NOL: WC Division  
Bldg 310  
(Dr. J. Dacons)

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = 129 cm

s = 0.07 log units

n = 50

EXPLOSIVE NAME: DIPAM

X NO.: 453\* ID: Z NO.: SSGT LOAD ORDER NO.: 974

SOURCE:

CHEMICAL NAME: 3,3' - Diamino-2,2',4,4',6,6' - hexanitrobiphenyl

DATE RECEIVED: LOT NO.:

INITIAL QUANTITY: 200 grams BATCH NO.:

MANUFACTURED BY:

NOL: WC Division  
Bldg 310  
(Dr. J. Dacons)

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = 114 cm

s = 0.09 log units

n =

Remarks

\*Special run: particle size above 105 $\mu$  (Fines removed by screening)

D 4 d 2

4 Sep 1973

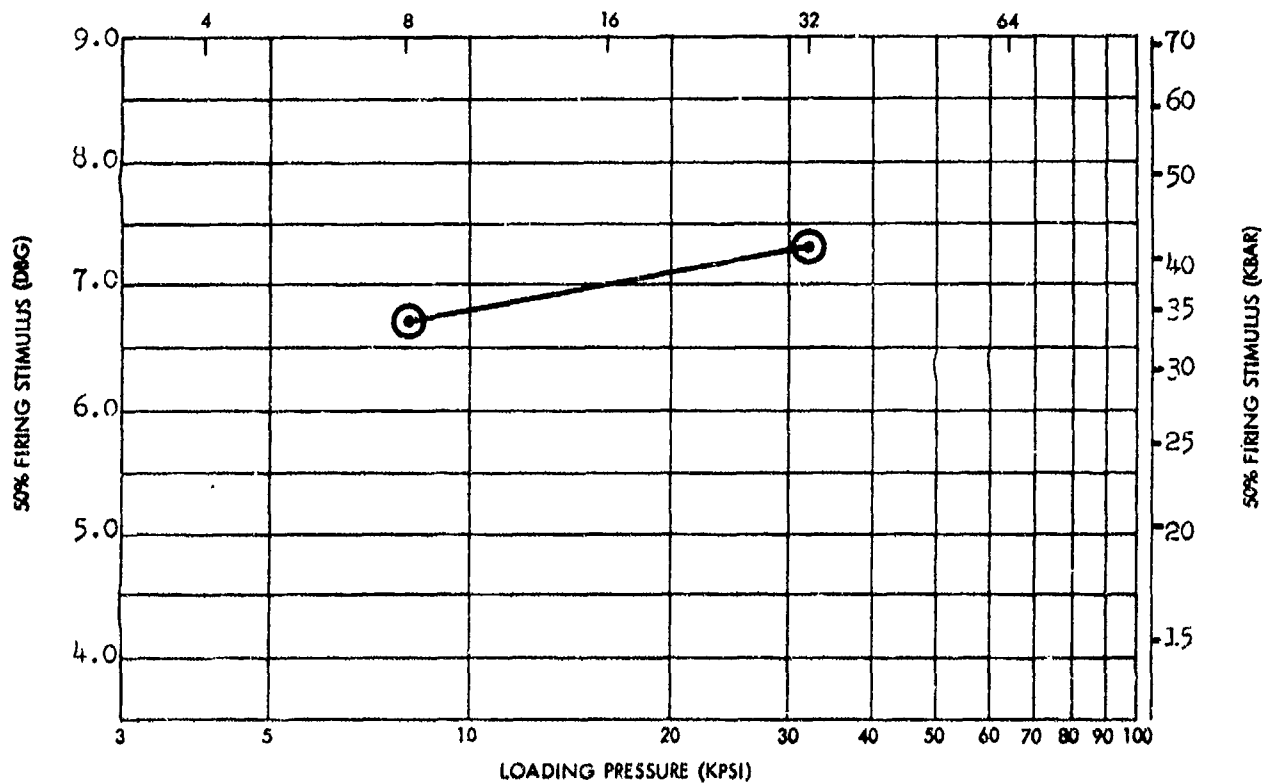
EXPLOSIVE | DIPAM  
TMD | 1.79

X NO. | 491  
I. D. NO. | -

Date of Test  
1/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                             | 1.290                            | 0.0164 | 72.1  | 6.704             | 0.2693 | 0.1584         | 18 | (1)     |
| 32                            | 1.608                            | 0.0125 | 89.8  | 7.297             | 0.1170 | 0.0672         | 18 | (1)     |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) Tested at -315°F



SMALL SCALE GAP TEST (SSGT) DATA  
DIPAM

D4e1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DIPAM

X NO.: 491 ID: Z NO.: SSGT LOAD ORDER NO.: 1111

SOURCE:

CHEMICAL NAME: 3,3' - Diamino-2,2',4,4',6,6' - hexanitrobiphenyl

DATE RECEIVED: LOT NO.: 251-67

INITIAL QUANTITY: 5 pounds BATCH NO.:

MANUFACTURED BY:  
American Cyanamide  
New Castle, Penn.

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

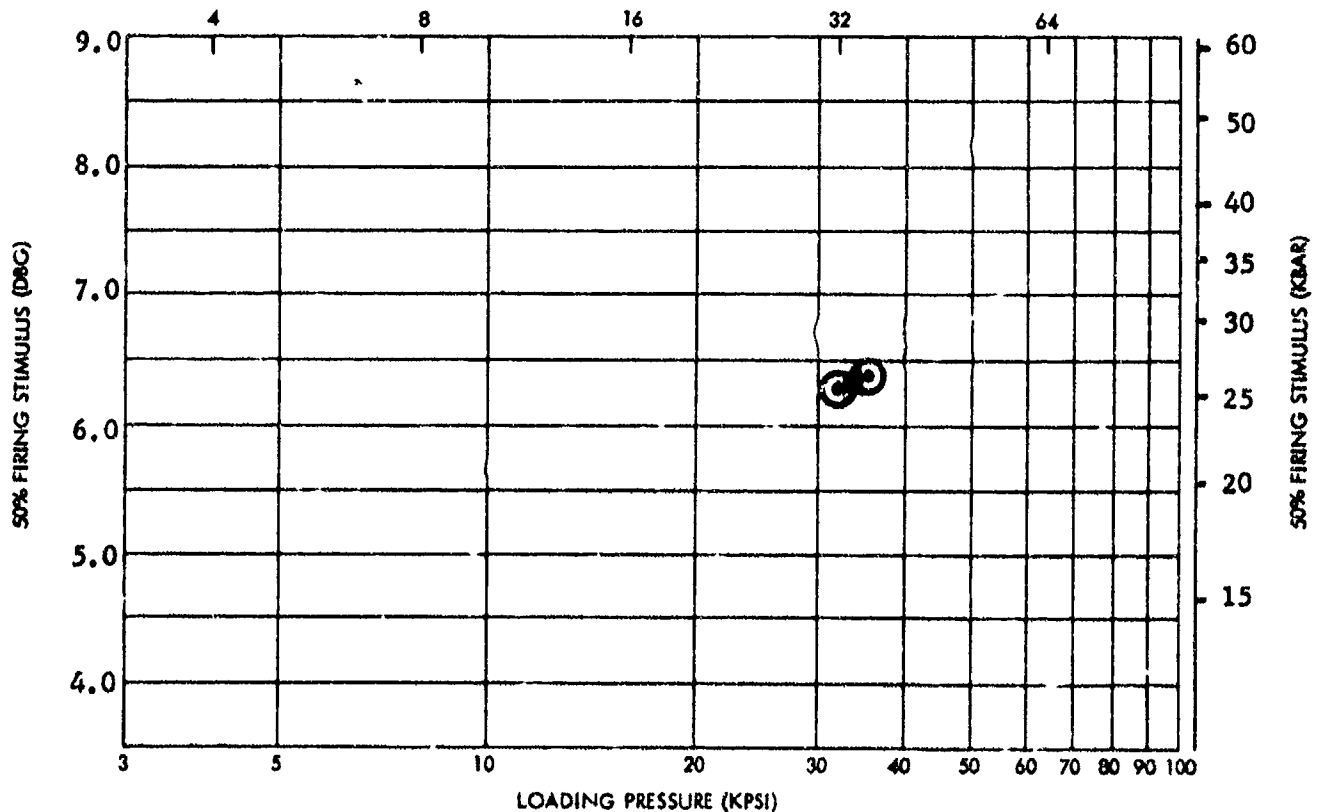
n =

Remarks



|           |              |           |            |              |
|-----------|--------------|-----------|------------|--------------|
| EXPLOSIVE | <u>DIPAM</u> | X NO.     | <u>546</u> | Date of Test |
| TMD       | <u>1.79</u>  | I. D. NO. | <u>-</u>   | <u>10/65</u> |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 32                      | 1.627                         | 0.0062 | 90.9  | 6.312             | 0.0290 | 0.0216         | 20 |         |
| 35                      | 1.642                         | 0.0057 | 91.7  | 6.372             | 0.0050 | 0.0040         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
DIPAM



NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DIPAM

X NO.: 546      ID:              Z NO.: 665      SSGT LOAD ORDER NO.: 1088

SOURCE:

CHEMICAL NAME: 3,3' - Diamino-2,2',4,4',6,6' - hexanitrobiphenyl

DATE RECEIVED: 10/7/65

LOT NO.: 8999-1

INITIAL QUANTITY: 2 pounds

BATCH NO.:

MANUFACTURED BY:  
Chemtronics (formerly AMCEL)  
Bee Tree Plant  
Swannanoa, N. C.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  =      cm

s =      log units

n =

Remarks

D 4 f 2

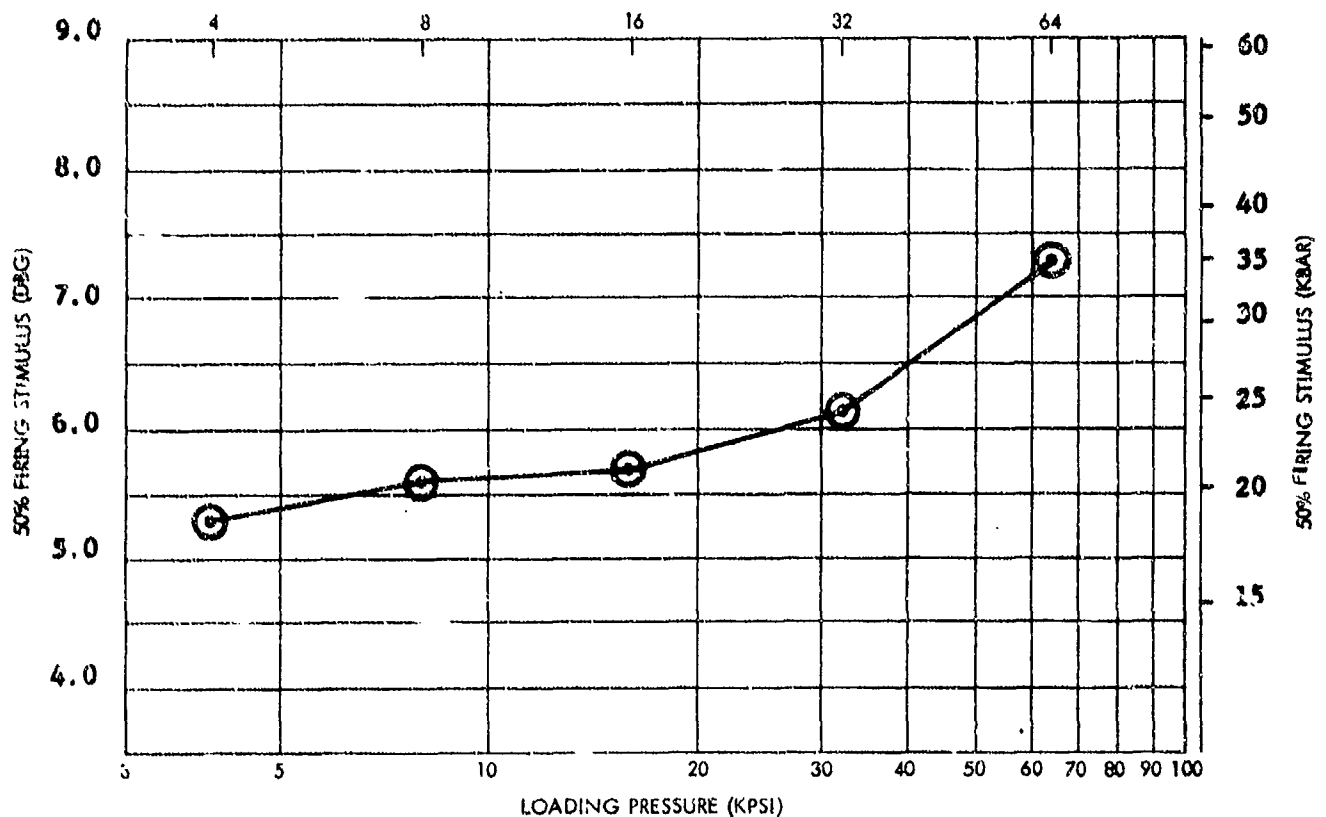
4 Sep 1973

EXPLOSIVE **DIPAM**  
TMD **1.79**

X NO. **549**  
I. D. NO. **-**

Date of Test  
**12/63**

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | s      | s <sub>m</sub> | N  |         |
| 4                       | 1.205                         | 0.0362 | 67.3  | 5.292             | 0.3246 | 0.1757         | 18 |         |
| 8                       | 1.348                         | 0.0174 | 75.3  | 5.547             | 0.0477 | 0.0317         | 18 |         |
| 16                      | 1.475                         | 0.0130 | 82.4  | 5.678             | 0.0414 | 0.0280         | 18 |         |
| 32                      | 1.638                         | 0.0098 | 91.5  | 6.141             | 0.0263 | 0.0206         | 18 |         |
| 64                      | 1.774                         | 0.0040 | 99.1  | 7.295             | 0.0437 | 0.0298         | 18 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
DIPAM

D4g1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DIPAM

X NO.: 549 ID: Z NO.: 671 SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: 3,3' - Diamino-2,2',4,4',6,6' - hexanitrobiphenyl

DATE RECEIVED: 10/28/65 LOT NO.: 8999-18 8999-21

INITIAL QUANTITY: 8 pounds BATCH NO.:

MANUFACTURED BY:

Chemtronics  
(formerly Northrup Carolina, Inc.)  
Bee Tree Plant  
Swannanoa, N. C.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

D 4 g 2

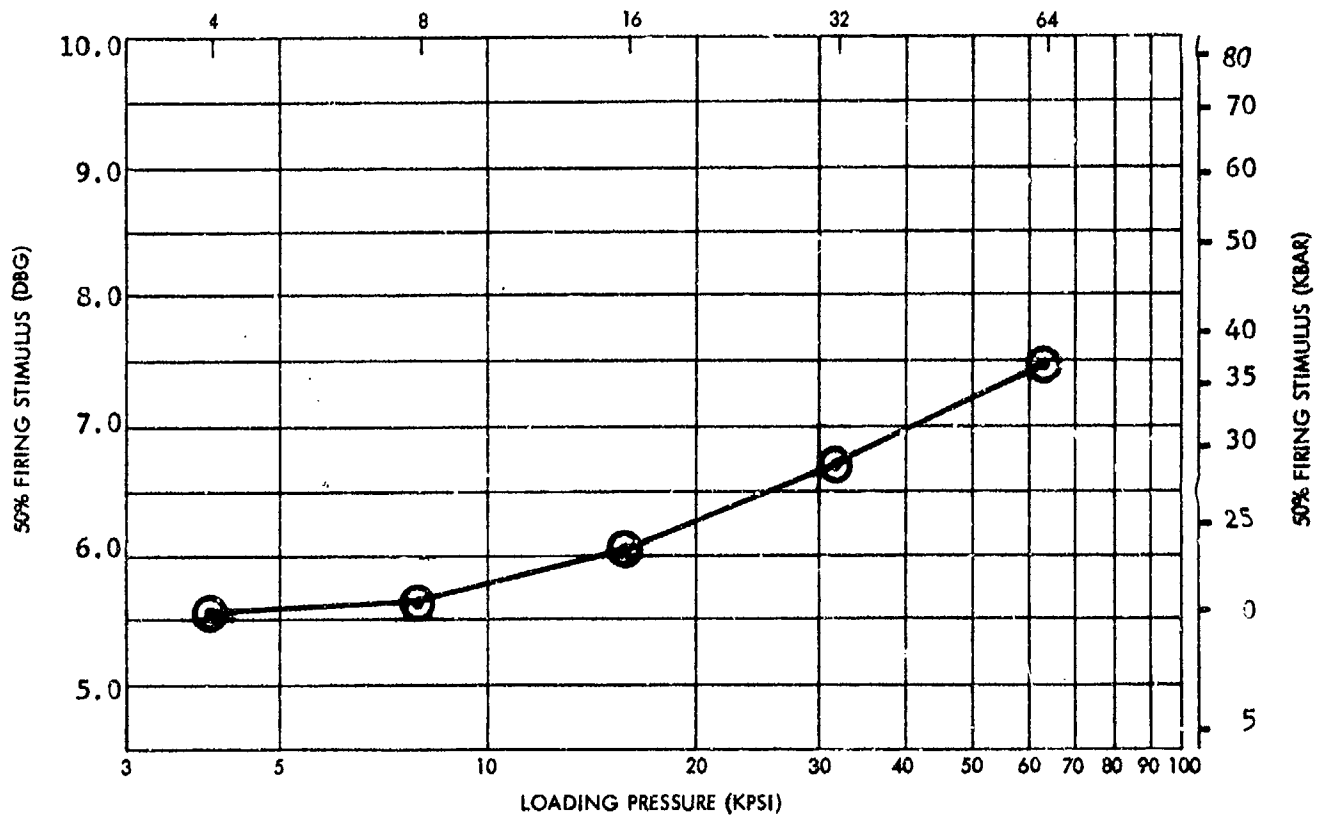
4 Sep 1973

|           |         |           |     |
|-----------|---------|-----------|-----|
| EXPLOSIVE | TACOT-Z | X NO.     | 330 |
| TMD       | 1.85    | I. D. NO. | -   |

Date of Test  
2/61

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.162                         | 0.0139 | 62.8  | 5.562             | 0.0773 | 0.0434         | 20 |         |
| 8                       | 1.281                         | 0.0100 | 69.2  | 5.656             | 0.0911 | 0.0490         | 20 |         |
| 16                      | 1.434                         | 0.0074 | 77.5  | 6.050             | -      | -              | 20 | (1)     |
| 32                      | 1.593                         | 0.0046 | 86.1  | 6.705             | 0.0788 | 0.0444         | 20 |         |
| 64                      | 1.698                         | 0.0100 | 91.8  | 7.487             | 0.1520 | 0.0932         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
TACOT-Z

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TACOT-Z

X NO.: 330

ID:

Z NO.:

SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: Tetranitrodibenzo -1,3a,4,6a -tetraazapentalene

DATE RECEIVED: 1/26/61

LOT NO.:

INITIAL QUANTITY: 5 pounds

BATCH NO.:

MANUFACTURED BY:

E. I. DuPont De Nemours & Co.  
Wilmington, Del.

IMPACT SENSITIVITY (1 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

1 = cm

s = log units

n =

Remarks

D5a2

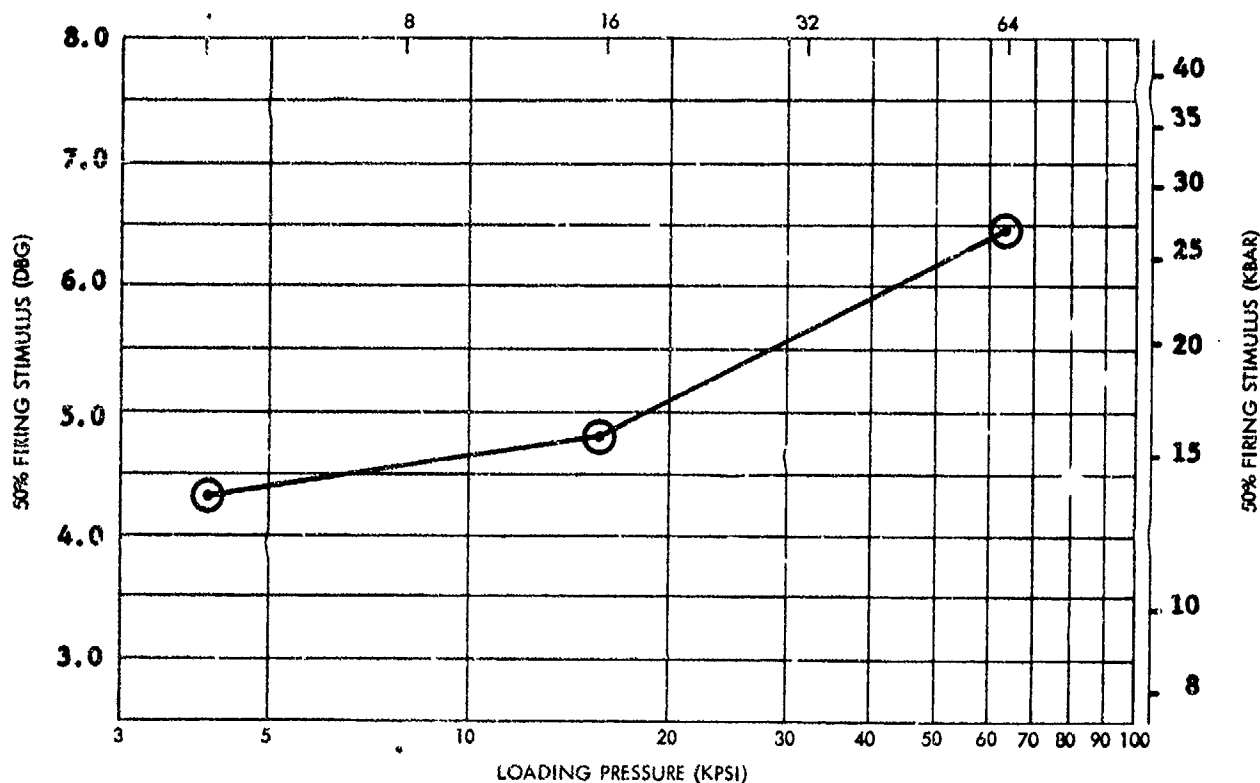
4 Sep 1973

|           |           |           |     |
|-----------|-----------|-----------|-----|
| EXPLOSIVE | HNS-R (1) | X NO.     | 401 |
| TMD       | 1.74      | I. O. NO. | --  |

Date of Test  
9/62

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.339                            | 0.0052 | 77.0  | 4.332             | 0.0070 | 0.0076         | 23 |         |
| 16                            | 1.524                            | 0.0049 | 87.6  | 4.833             | 0.0203 | 0.0235         | 23 |         |
| 64                            | 1.707                            | 0.0043 | 98.1  | 6.458             | 0.0351 | 0.0234         | 23 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) An HNS recrystallized slowly from HNS-I; see NOLTR 66-94



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-R

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-R (1)

X NO.: 401 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 8/1/62

LOT NO.:

INITIAL QUANTITY: 3 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks



D 6 a 2

4 Sep 1973

NOLTR 73-132

THIS PAGE INTENTIONALLY LEFT BLANK

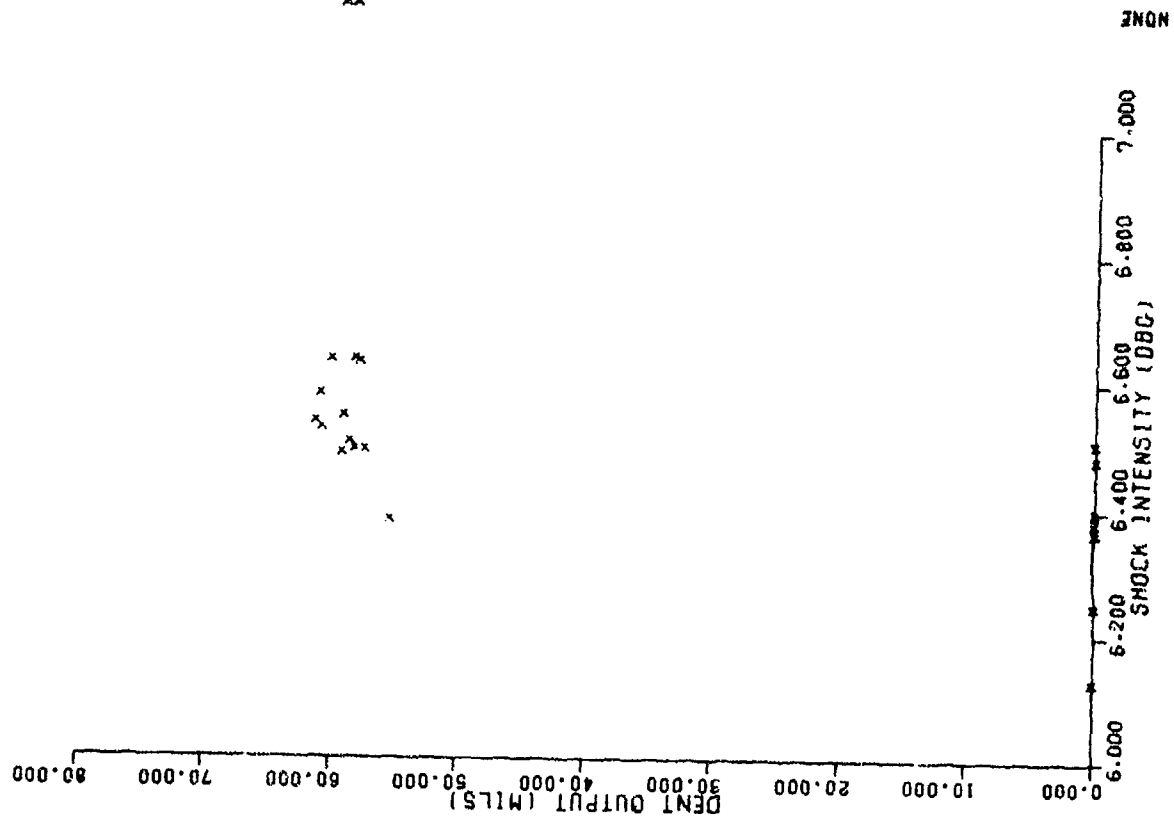
D6a3/D6a4





De-En

HNS-R (X 401) 64 KPSI



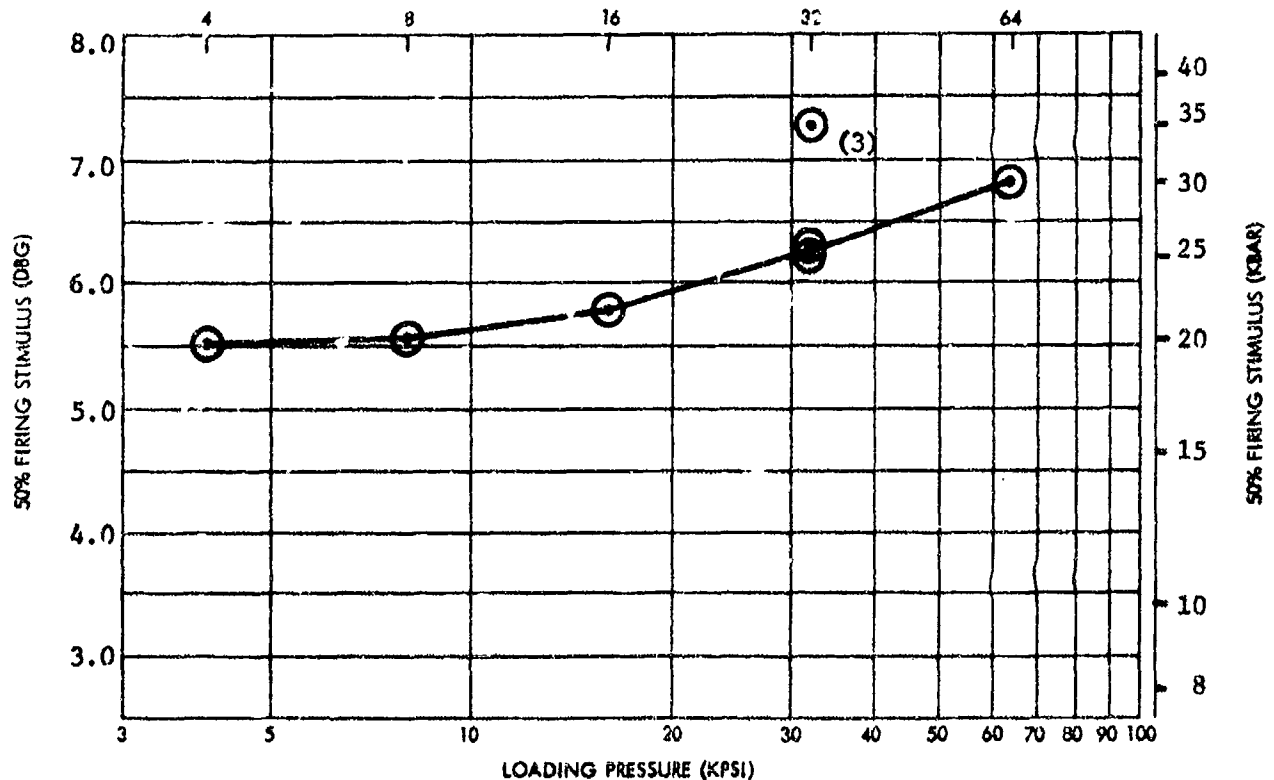
D6a6

|           |       |           |     |
|-----------|-------|-----------|-----|
| EXPLOSIVE | HNS-I | X NO.     | 498 |
| TMD       | 1.74  | I. D. NO. | --  |

Date of Test  
9/64

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.116                            | 0.0136 | 64.1  | 5.507             | 0.0536 | 0.0322         | 20 |         |
| 8                             | 1.226                            | 0.0122 | 70.5  | 5.561             | --     | --             | 20 | (1)     |
| 16                            | 1.377                            | 0.0067 | 79.1  | 5.779             | 0.0161 | 0.0198         | 20 |         |
| 32                            | 1.537                            | 0.0083 | 88.3  | 6.263             | 0.0240 | 0.0191         | 20 |         |
| 32                            | 1.542                            | 0.0088 | 88.6  | 6.322             | --     | --             | 20 | (1) (2) |
| 32                            | 1.541                            | 0.0049 | 88.6  | 7.368             | 0.0167 | 0.0208         | 20 | (3)     |
| 64                            | 1.669                            | 0.0034 | 95.9  | 6.820             | 0.0266 | 0.0224         | 20 |         |

- (1) No mixed response zone  
 (2) Date of test - 10/65  
 (3) Tested at -65°F



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-I

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I

X NO.: 498

ID:

Z NO.:

SSGT LOAD ORDER NO.: 962,  
1089

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 8/5/64

LOT NO.: 333-544 333-545  
333-546 333-547

INITIAL QUANTITY: 21 pounds

BATCH NO.:

MANUFACTURED BY:  
American Cyanamide  
New Castle, Penn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{s}$  = 47 cm

$s$  = 0.14 log units

$n$  = 25

Remarks

Dried 24 hours @ 150°C, Air oven  
Particle size 99.7% through 325 mesh

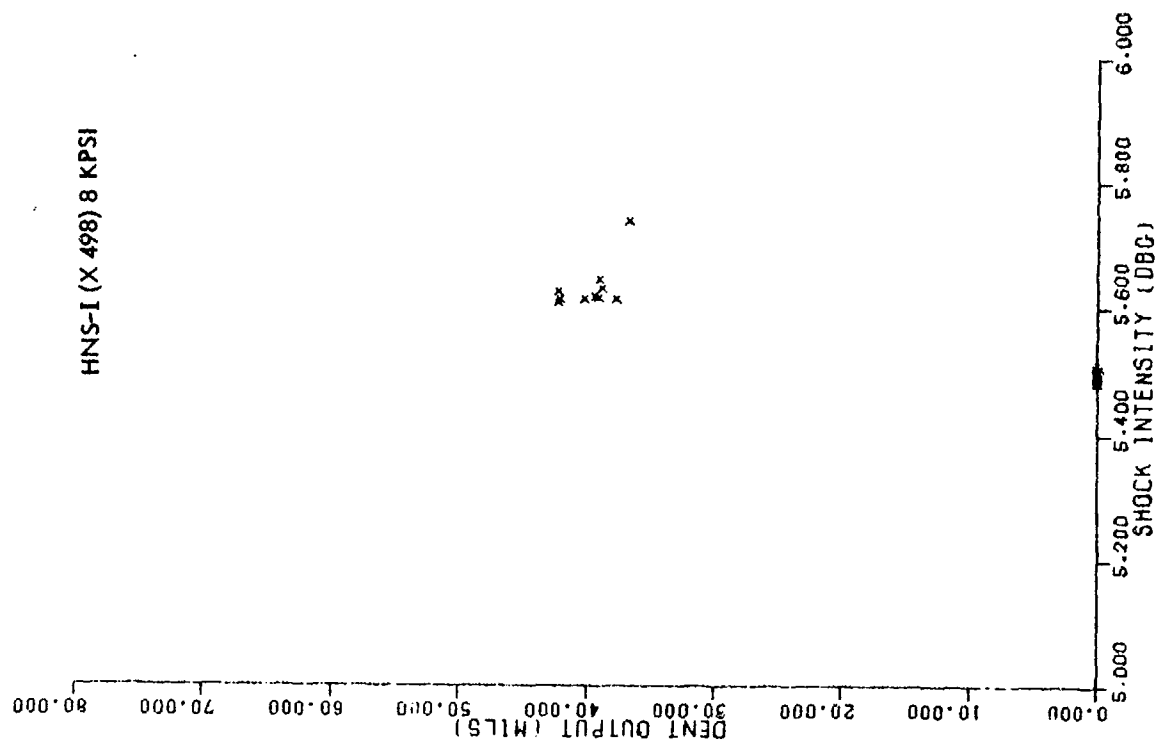


NOLTR 73-132

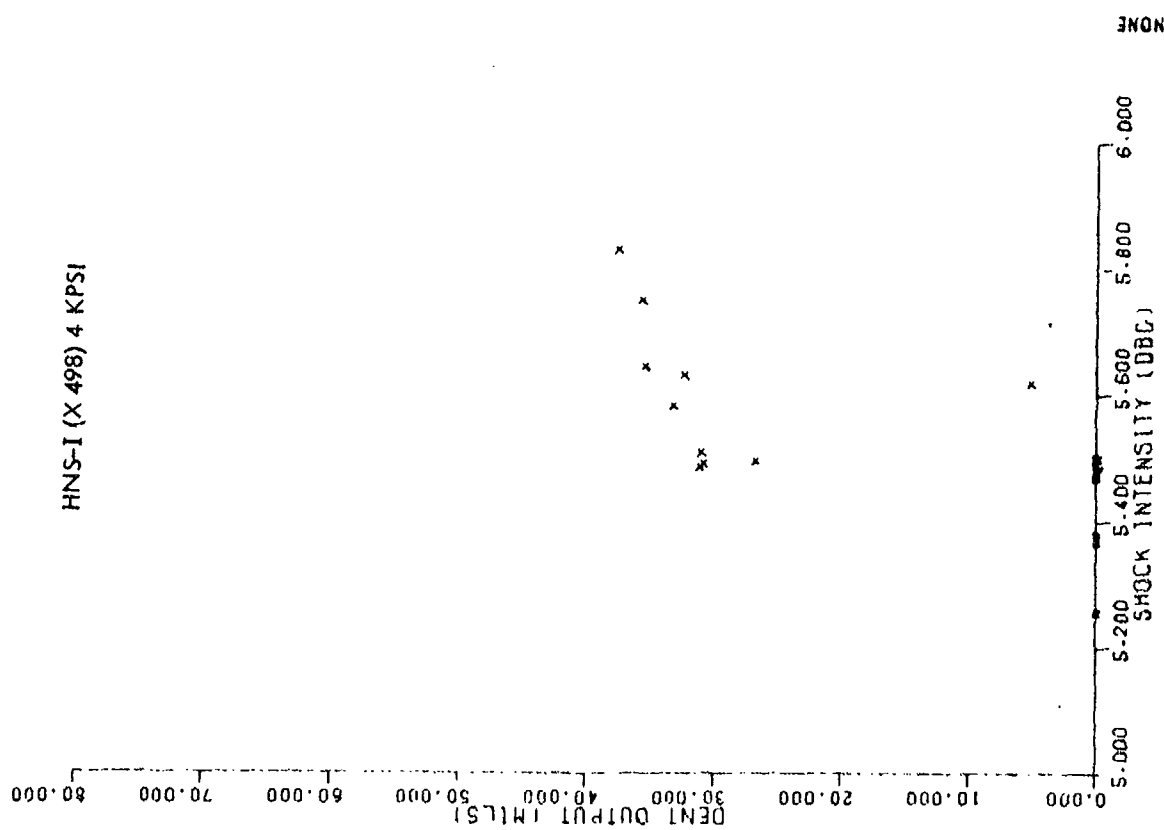
THIS PAGE INTENTIONALLY LEFT BLANK

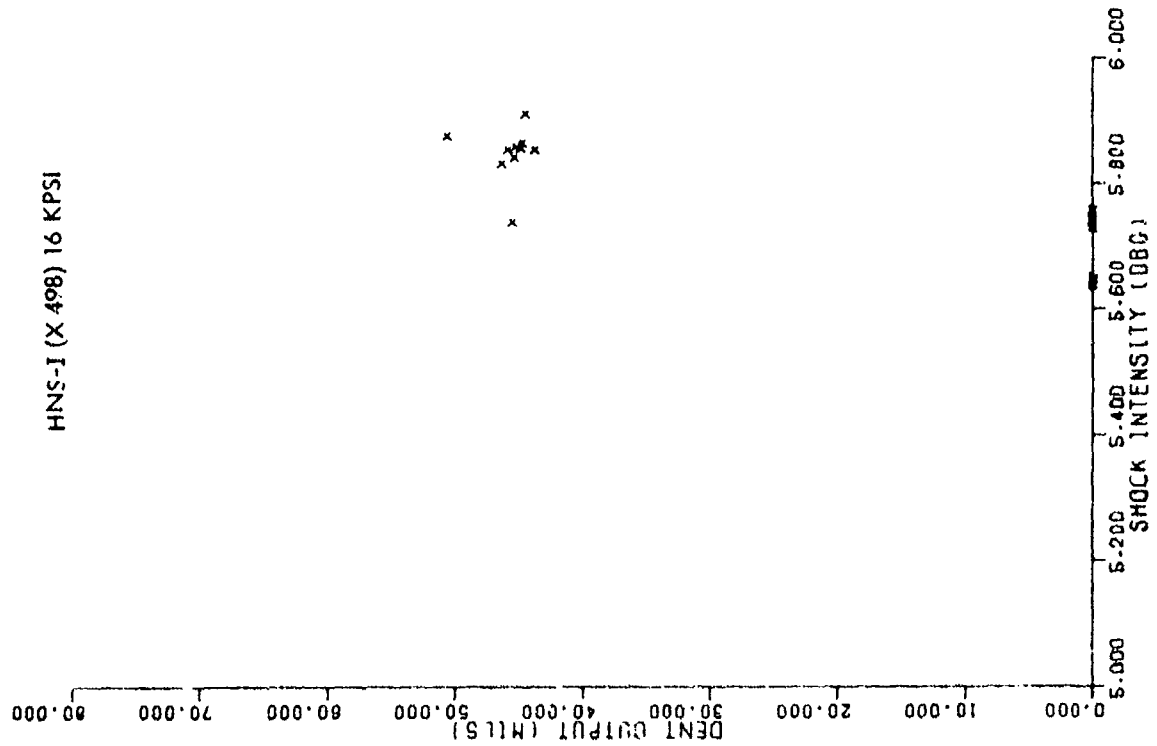
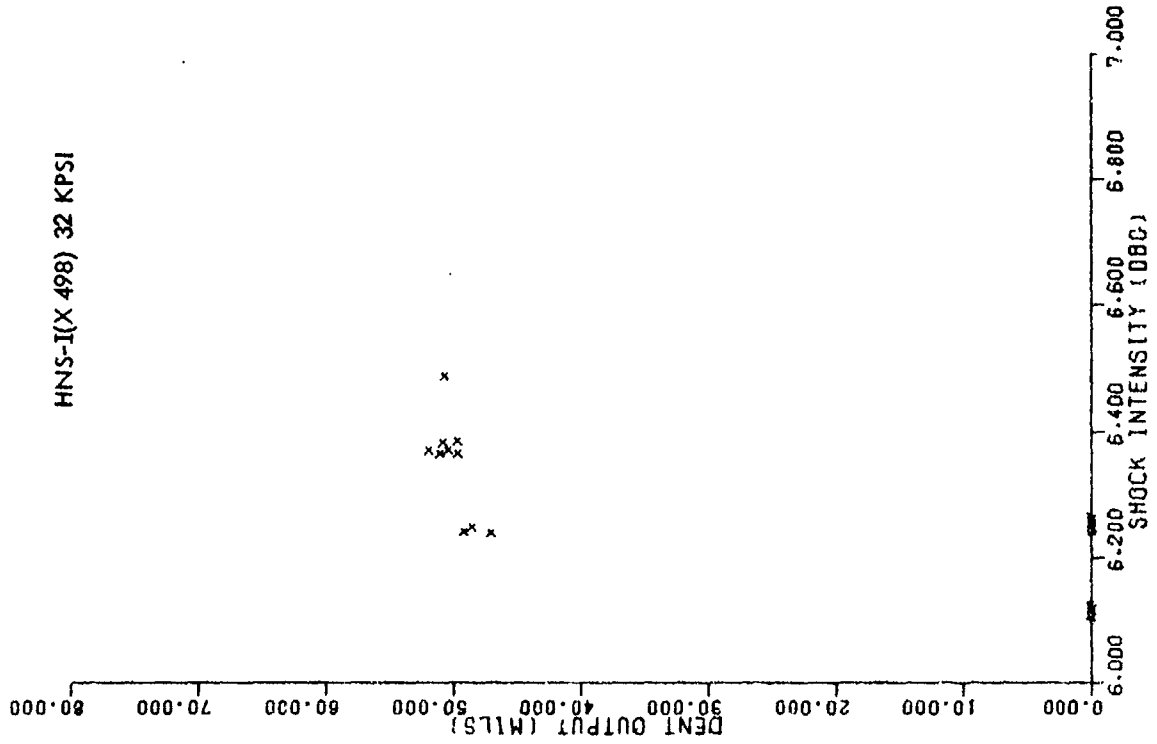
D7a3/D7a4

**HNS-I (X 498) 8 KPSI**



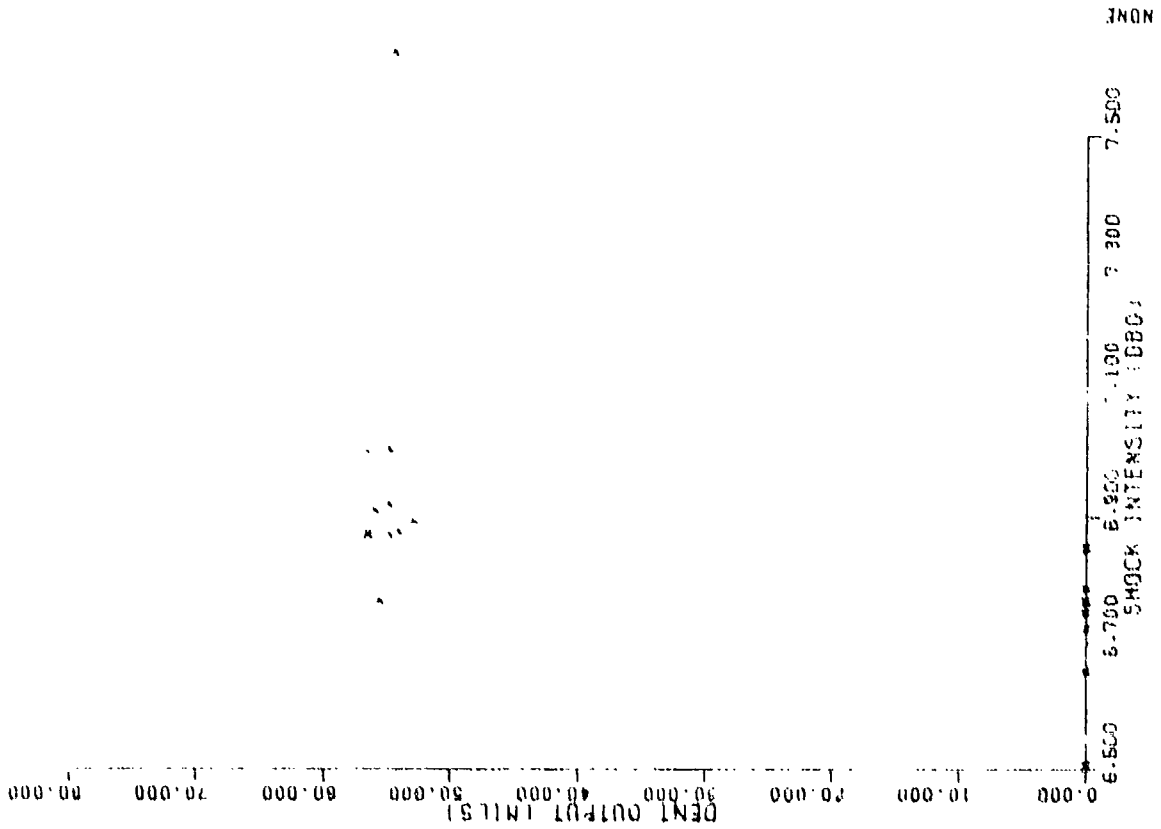
HNS-I (X 498) 4 KPSI





NO. 73-132

1541 7884 498 64 1 251



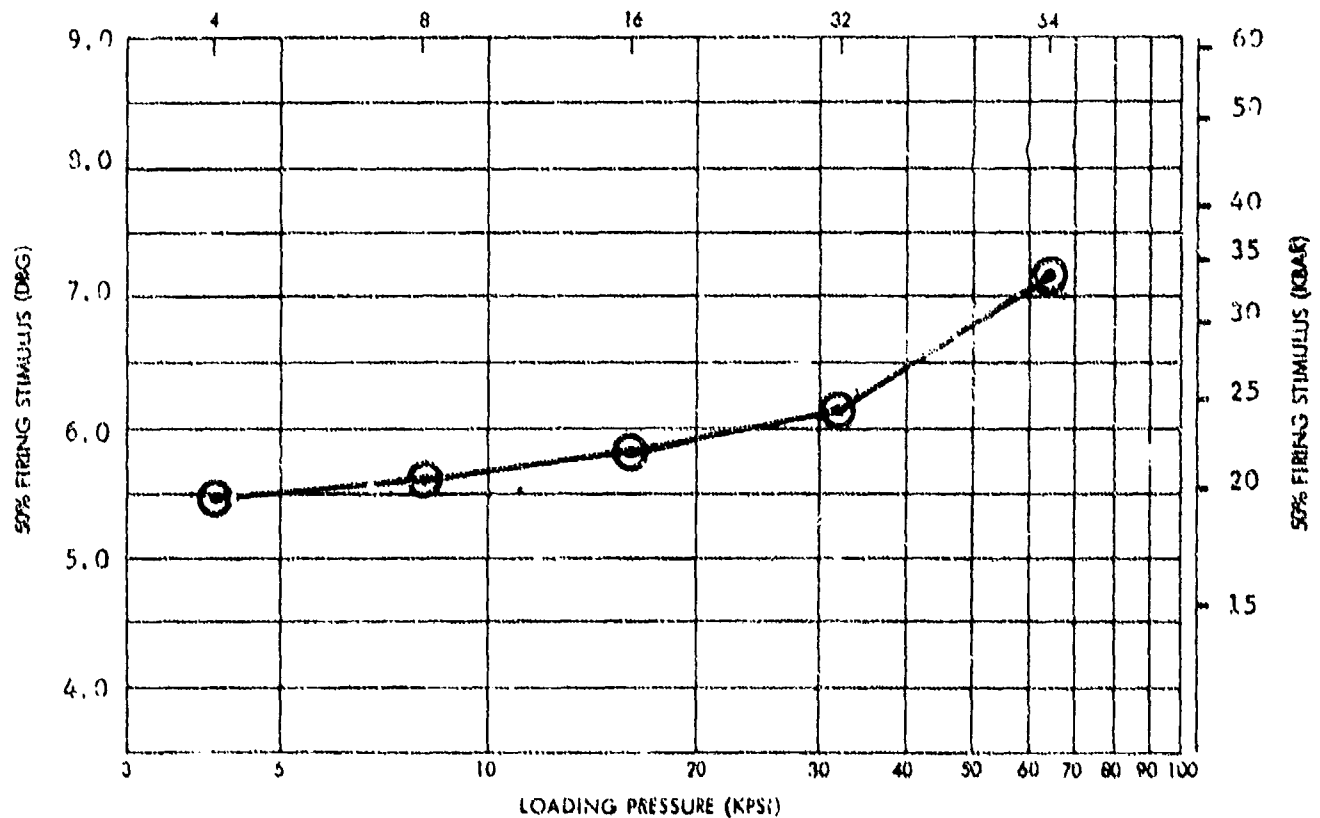
0757/0758



|           |       |           |     |              |
|-----------|-------|-----------|-----|--------------|
| EXPLOSIVE | HNS-I | X NO.     | 534 | Date of Test |
| TMD       | 1.74  | I. D. NO. | -   | 6/65         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 4                       | 1.156                         | 0.0071 | 66.4  | 5.441             | -      | -              | 20 | (1)     |
| 8                       | 1.267                         | 0.0128 | 72.8  | 5.620             | 0.0069 | 0.0184         | 20 |         |
| 16                      | 1.404                         | 0.0100 | 80.7  | 5.850             | 0.0530 | 0.0315         | 20 |         |
| 32                      | 1.529                         | 0.0065 | 87.9  | 6.123             | 0.0076 | 0.0137         | 20 |         |
| 64                      | 1.682                         | 0.0026 | 96.7  | 7.173             | 0.0389 | 0.0256         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-I

D7b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I

X NO.: 534 ID: Z NO.: 655 SSGT LOAD ORDER NO.: 1067

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 6/24/65

LOT NO.: 333-72

INITIAL QUANTITY: 1 pound

BATCH NO.:

MANUFACTURED BY:  
American Cyanamide  
New Castle, Penn.

IMPACT SENSITIVITY (S or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST 7/7/65

S = 55 cm

s = 0.11log units

n =

Remarks

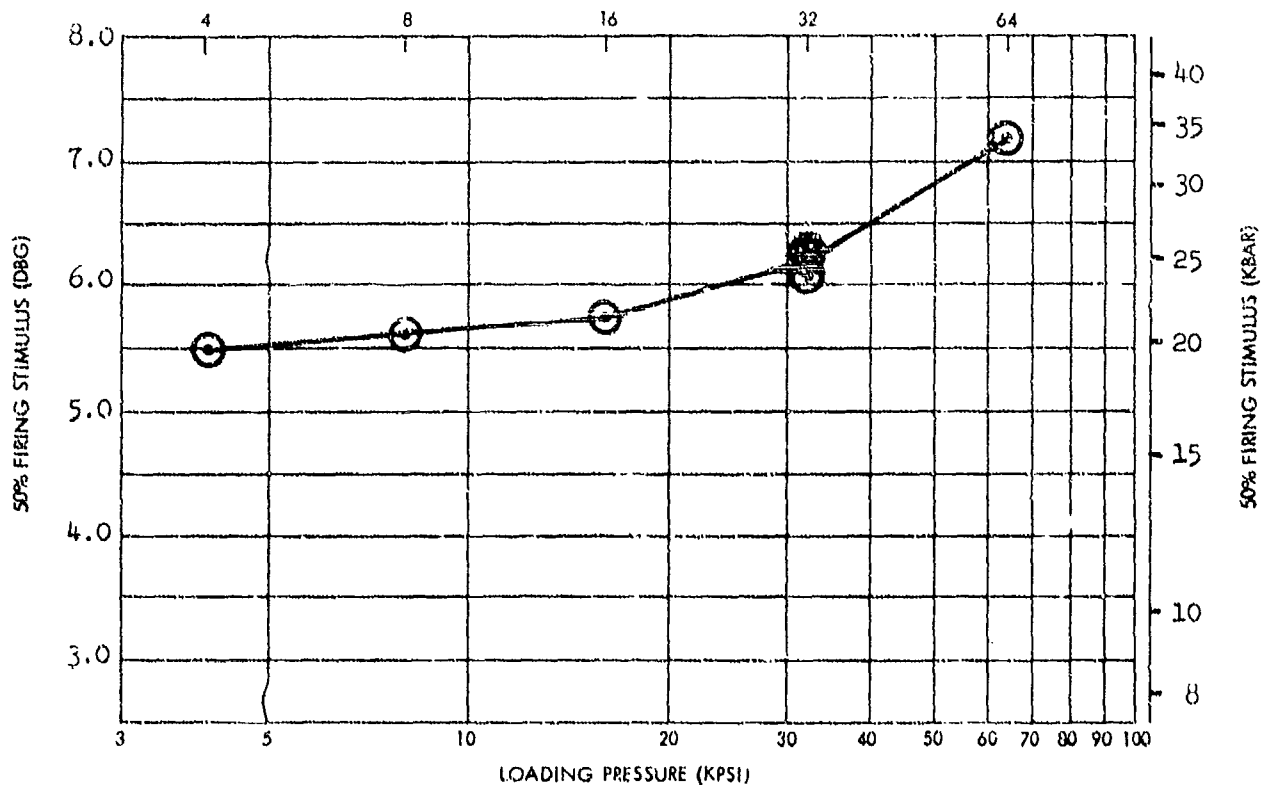
EXPLOSIVE HNS-I  
TMD 1.74

X NO. 537  
I. D. NO. -

Date of Test  
10/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.144                            | 0.0109 | 65.7  | 5.483             | 0.0231 | 0.0198         | 20 |         |
| 8                             | 1.259                            | 0.0102 | 72.4  | 5.615             | 0.0140 | 0.0267         | 20 |         |
| 16                            | 1.409                            | 0.0059 | 81.0  | 5.735             | 0.0257 | 0.0174         | 20 |         |
| 32                            | 1.555                            | 0.0056 | 89.4  | 6.234             | 0.0226 | 0.0171         | 20 |         |
| 32                            | 1.539                            | 0.0045 | 88.4  | 6.058             | 0.0360 | 0.0269         | 18 | (1.)    |
| 32                            | 1.546                            | 0.0069 | 88.9  | 6.263             | 0.1345 | 0.0692         | 21 | (1.)    |
| 64                            | 1.681                            | 0.0033 | 96.6  | 7.173             | 0.0408 | 0.0267         | 20 |         |

(1) Date of Test - 5/66



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-I

D7c1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I

X NO.: 537      ID:      Z NO.:      SSGT LOAD ORDER NO.: 1090

SOURCE:      1091  
1123

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 6/1/65      LOT NO.: 333-72

INITIAL QUANTITY: 25 pounds      BATCH NO.:

MANUFACTURED BY:  
American Cyanamide  
New Castle, Penn.

IMPACT SENSITIVITY (1 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

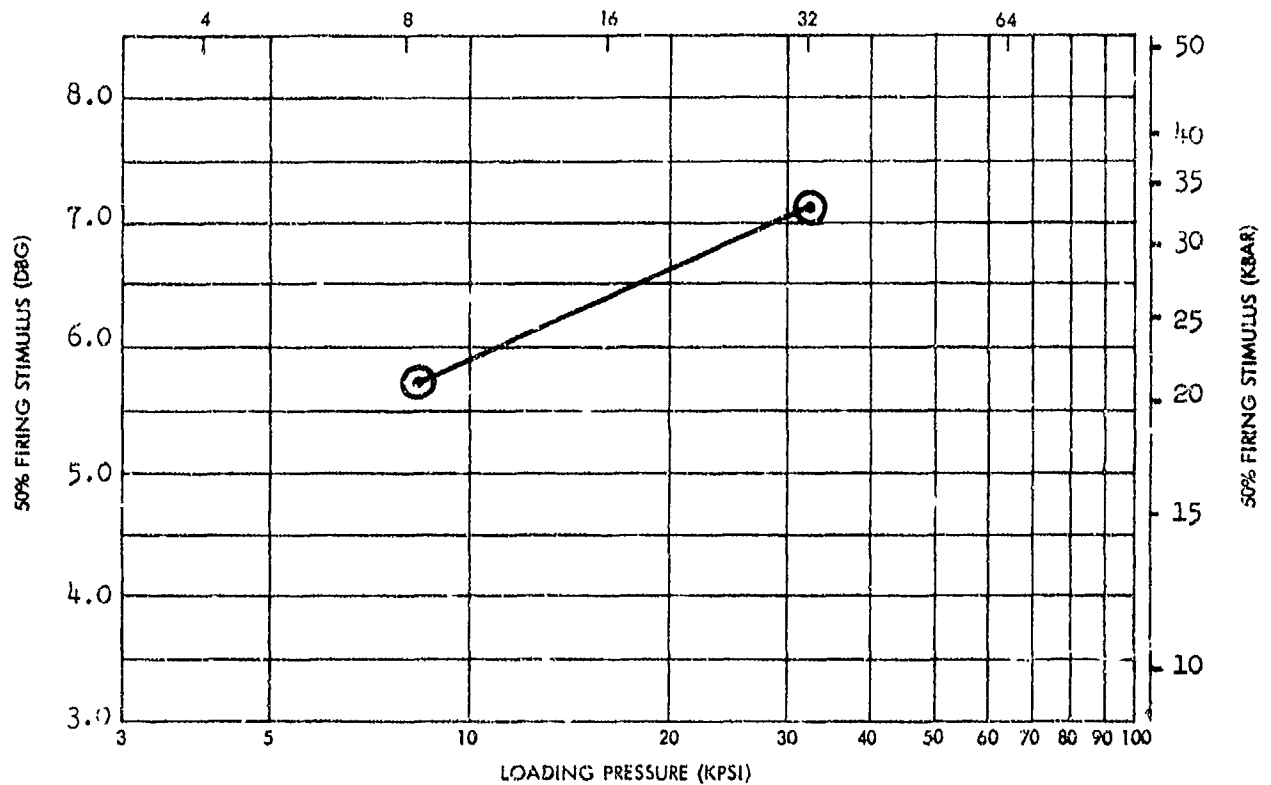
Remarks

Same as X 534

|           |              |           |            |              |
|-----------|--------------|-----------|------------|--------------|
| EXPLOSIVE | <u>HNS-I</u> | X NO.     | <u>537</u> | Date of Test |
| YMD       | <u>1.74</u>  | I. D. NO. | <u>-</u>   | <u>1/65</u>  |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.236                         | 0.0136 | 71.0  | 5.724             | 0.1075 | 0.0622         | 19 | (1)     |
| 32                      | 1.535                         | 0.0041 | 88.2  | 7.126             | 0.2234 | 0.1385         | 17 | (1)     |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Tested at - 315°F



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-I

D7d1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: HNS-I

X NO.: 537      ID:      Z NO.:      SSGT LOAD ORDER NO.: 1110

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 6/1/65

LOT NO.: 333-72

INITIAL QUANTITY: 25 pounds

BATCH NO.:

MANUFACTURED BY:  
American Cyanamide  
New Castle, Penn.

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  =      cm

s =      log units

n =

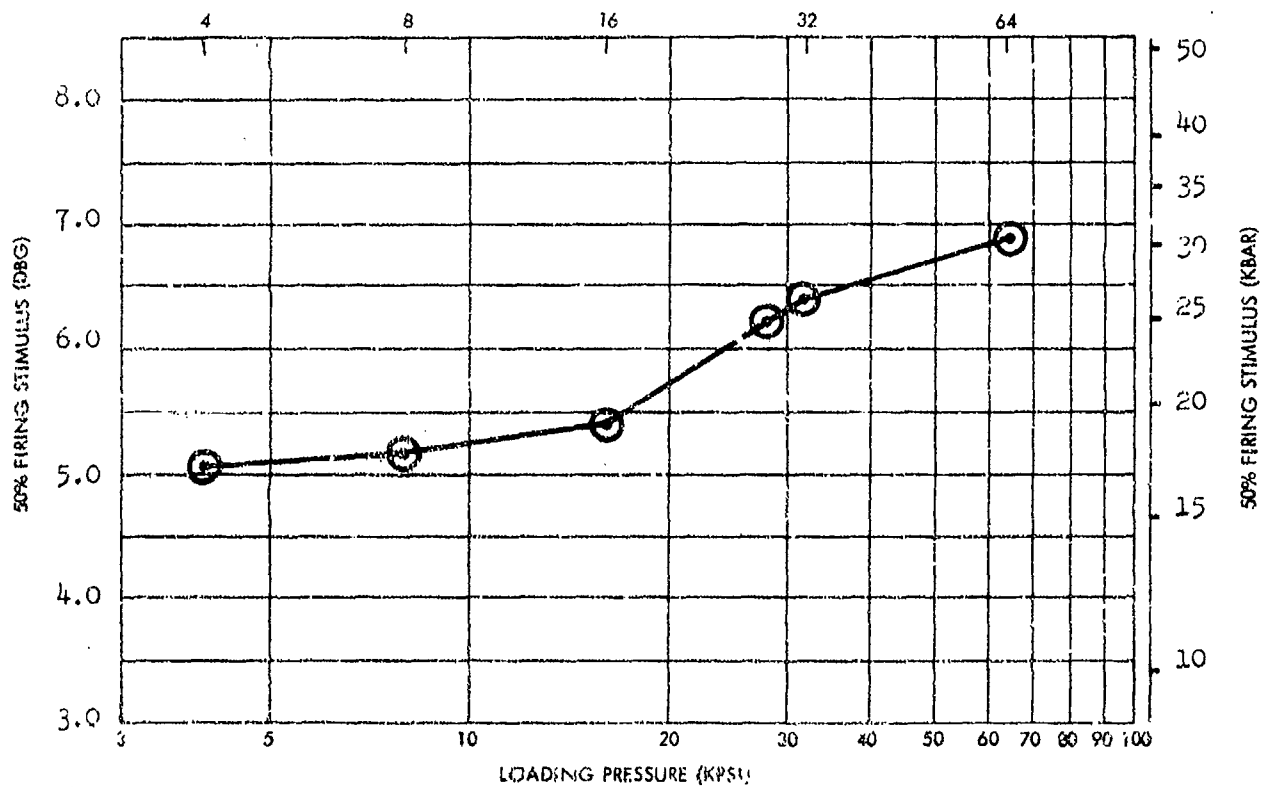
Remarks  
Same as X 534

EXPLOSIVE HNS-I (B)  
TMD 1.74

X NO. 539  
I. D. NO. -

Date of Test 8/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |               |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|---------------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g             | s <sub>m</sub> | N  |         |
| 4                       | 1.192                         | 0.0134 | 68.5  | 5.058             | 0.0324        | 0.0260         | 20 |         |
| 8                       | 1.298                         | 0.0103 | 74.6  | 5.177             | 0.0727        | 0.0423         | 20 |         |
| 16                      | 1.439                         | 0.0067 | 82.7  | 5.382             | 0.0271        | 0.0333         | 20 |         |
| 28                      | 1.527                         | 0.0043 | 87.8  | <b>6.202</b>      | <b>0.0496</b> | <b>0.0312</b>  | 20 |         |
| 32                      | 1.590                         | 0.0084 | 91.4  | 6.399             | 0.0332        | 0.0239         | 20 |         |
| 64                      | 1.691                         | 0.0026 | 97.1  | 6.900             | 0.0536        | 0.0338         | 20 |         |



SMALL SCALE GAP TEST (SGT) DATA  
HNS-I (B)

D7e1

4 Sep 1973

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I (B) \*

X NO.: 539      ID:      Z NO.: 664      SSGT LOAD ORDER NO.: 1075

SOURCE: B310      1076  
1085

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 8/3/65      LOT NO.: 8995-29

INITIAL QUANTITY: 1 pound      BATCH NO.:

MANUFACTURED BY:

Chemtronics (formerly AMCEL)  
Bee Tree Plant  
Swannanoa, N. C.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

Remarks

\*The "B" signifies that this particular lot of explosive has been subjected to the SSGT Sensitivity Test of WS 5003 and has passed.



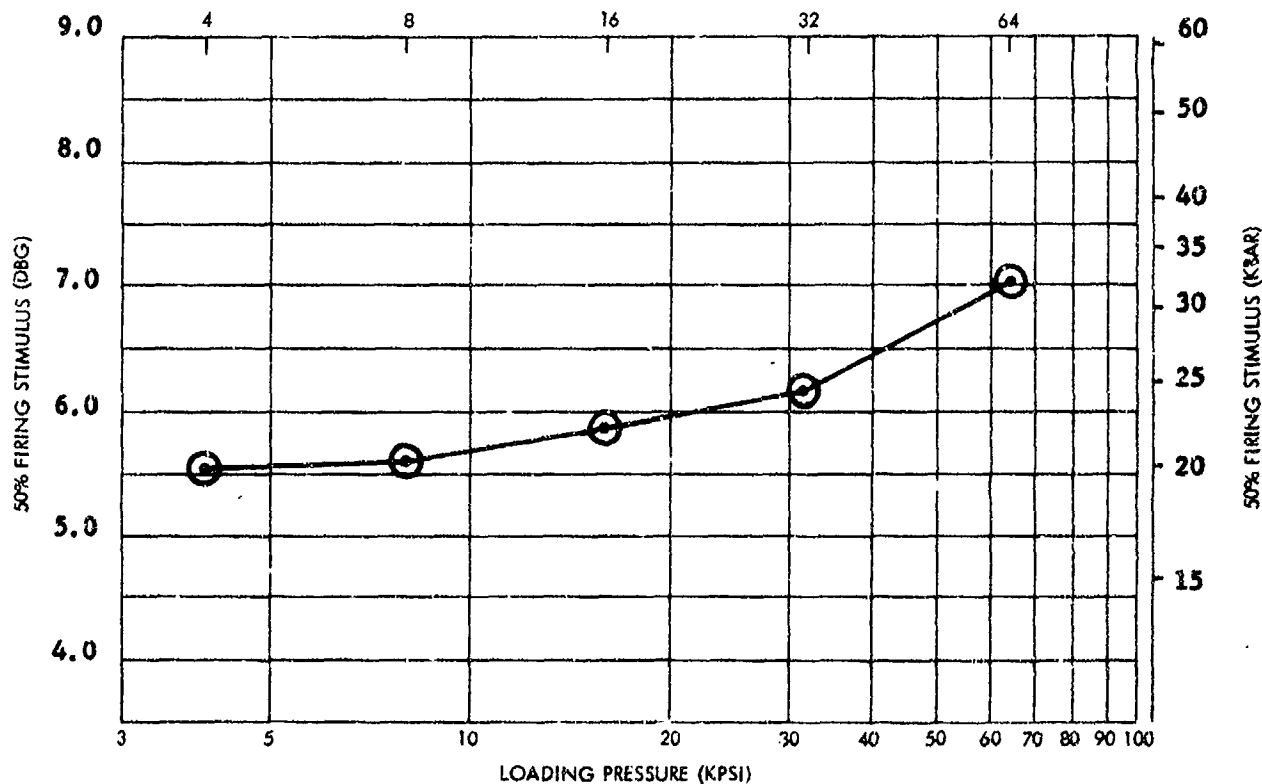
EXPLOSIVE **HNS-I (B)**  
TMD **1.74**

X NO. **565**  
I. D. NO. **-**

Date of Test  
**5/66**

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.122                         | 0.0204 | 64.5  | 5.556             | -      | -              | 18 | (1)     |
| 8                       | 1.237                         | 0.0176 | 71.1  | 5.627             | -      | -              | 18 | (1)     |
| 16                      | 1.378                         | 0.0184 | 79.2  | 5.856             | 0.0179 | 0.0416         | 18 |         |
| 32                      | 1.519                         | 0.0101 | 87.3  | 6.235             | 0.0292 | 0.0192         | 18 |         |
| 64                      | 1.662                         | 0.0029 | 95.5  | 7.003             | 0.0194 | 0.0167         | 18 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-I (B)

D7f1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I (B) \*

X NO.: 565      ID:              Z NO.:              SSGT LOAD ORDER NO.: 1125

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 4/27/66              LOT NO.:

INITIAL QUANTITY: 25 pounds              BATCH NO.:

MANUFACTURED BY:

Chemtronics  
(formerly Northrup Carolina, Inc.)  
Bee Tree Plant  
Swannanoa, N. C.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

DATE OF TEST

§ =              cm

s =              log units

n =

Remarks

\*The "B" signifies that this particular lot of explosive has been subjected to the SSGT Sensitivity Test of WS 5003 and has passed.

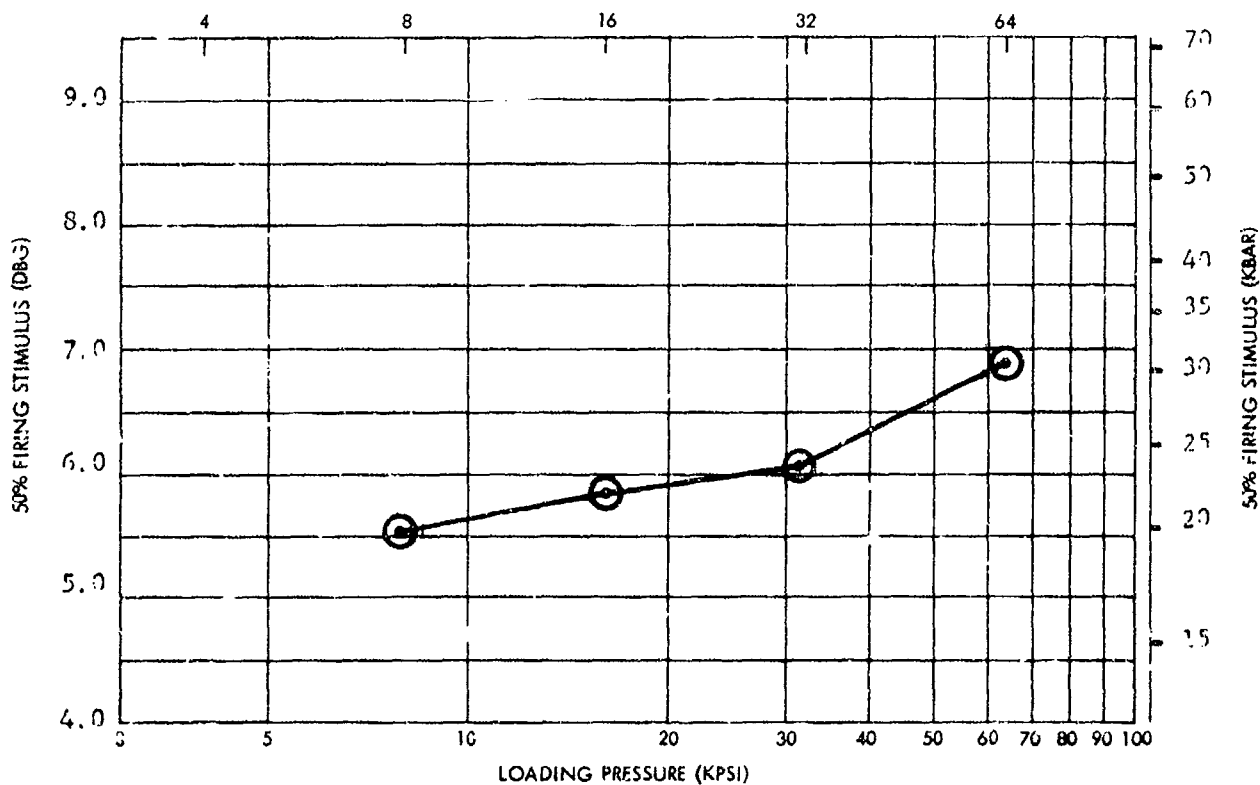
EXPLOSIVE HNS-I (B)  
TMD 1.74

X NO. 705  
I. D. NO. 1071

Date of Test  
7/69

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.351                         | 0.0067 | 77.6  | 5.541             | 0.0654 | 0.0411         | 20 |         |
| 16                      | 1.458                         | 0.0044 | 83.8  | 5.856             | 0.0920 | 0.0511         | 20 |         |
| 32                      | 1.586                         | 0.0042 | 91.1  | 6.057             | -      | -              | 7  | (1)     |
| 64                      | 1.694                         | 0.0060 | 97.4  | 6.903             | 0.0259 | 0.0225         | 18 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-1 (B)

D7g1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I (B) \*

X NO.: 705 ID: 1071 Z NO.: SSGT LOAD ORDER NO.: 1272

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 7/16/69 LOT NO.: 4333

INITIAL QUANTITY: 10 pounds BATCH NO.:

MANUFACTURED BY:

Chemtronics

(formerly Northrup Carolina, Inc.)

Bee Tree Plant

Swannanoa, N. C.

IMPACT SENSITIVITY (3 or 50% point)

(Type 12 Tools; 2.5 Kg wt; Sandpaper)

DATE OF TEST

3 = cm

s = log units

n =

Remarks

\*The "B" signifies that this particular lot of explosive has been subjected to the SSGT Sensitivity Test of WS 5003 and passed.

NCLTR 73-132

EXPLOSIVE **HNS-I**

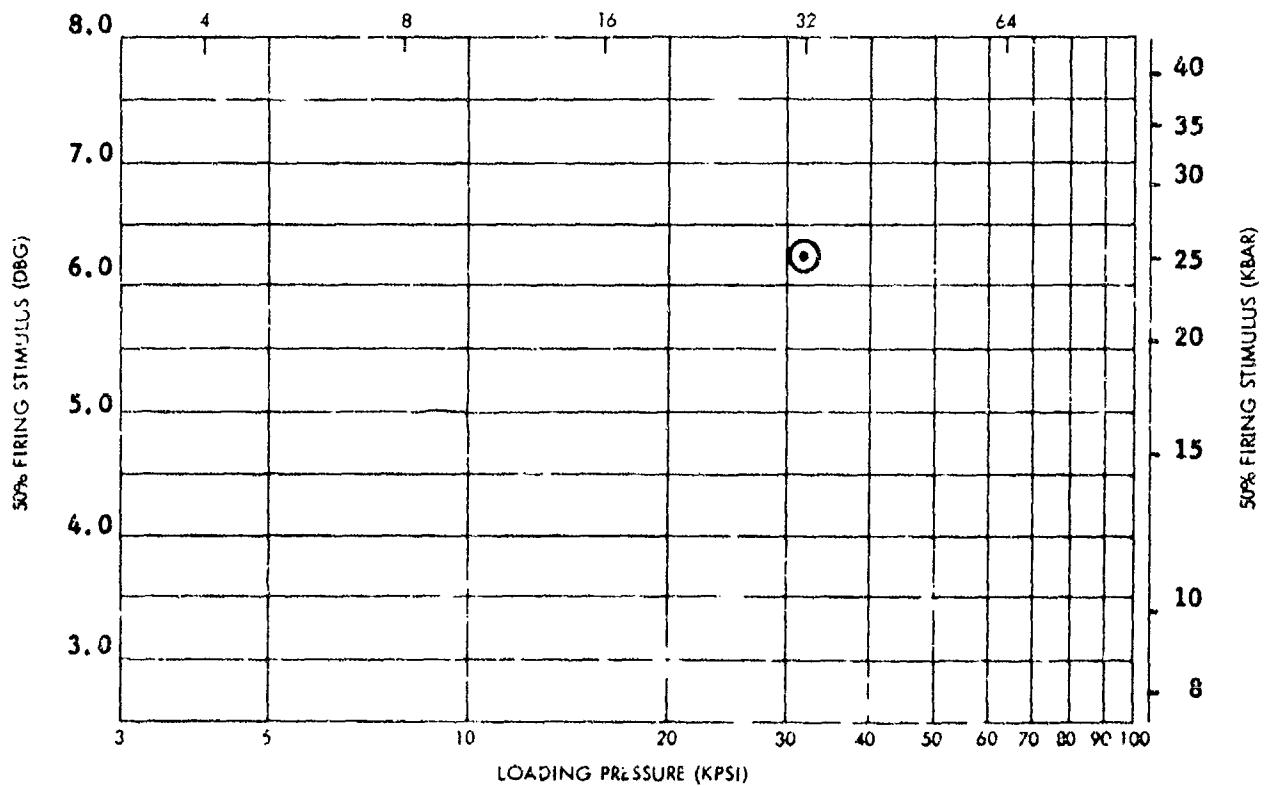
X NO. **716**

Date of Test  
**7/69**

TMD **1.74**

I. D. NO. **2090**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |               | % TMD       | SENSITIVITY (DBG) |               |                |           | REMARKS |
|-------------------------------|----------------------------------|---------------|-------------|-------------------|---------------|----------------|-----------|---------|
|                               | AVG.                             | s             |             | AVG.              | g             | s <sub>m</sub> | N         |         |
| <b>32</b>                     | <b>1.546</b>                     | <b>0.0039</b> | <b>88.9</b> | <b>6.245</b>      | <b>0.0249</b> | <b>0.0190</b>  | <b>25</b> |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |
|                               |                                  |               |             |                   |               |                |           |         |



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-I

D7h1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I

X NO.: 716 ID: 1090 Z NO.: SSGT LOAD ORDER NO.: 1273

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 8/26/69

LOT NO.: DEL-310-25

INITIAL QUANTITY: 150 grams

BATCH NO.:

MANUFACTURED BY:

Del Mar Lab  
Los Angeles, Calif.

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

3 = cm

s = log units

n =

Remarks

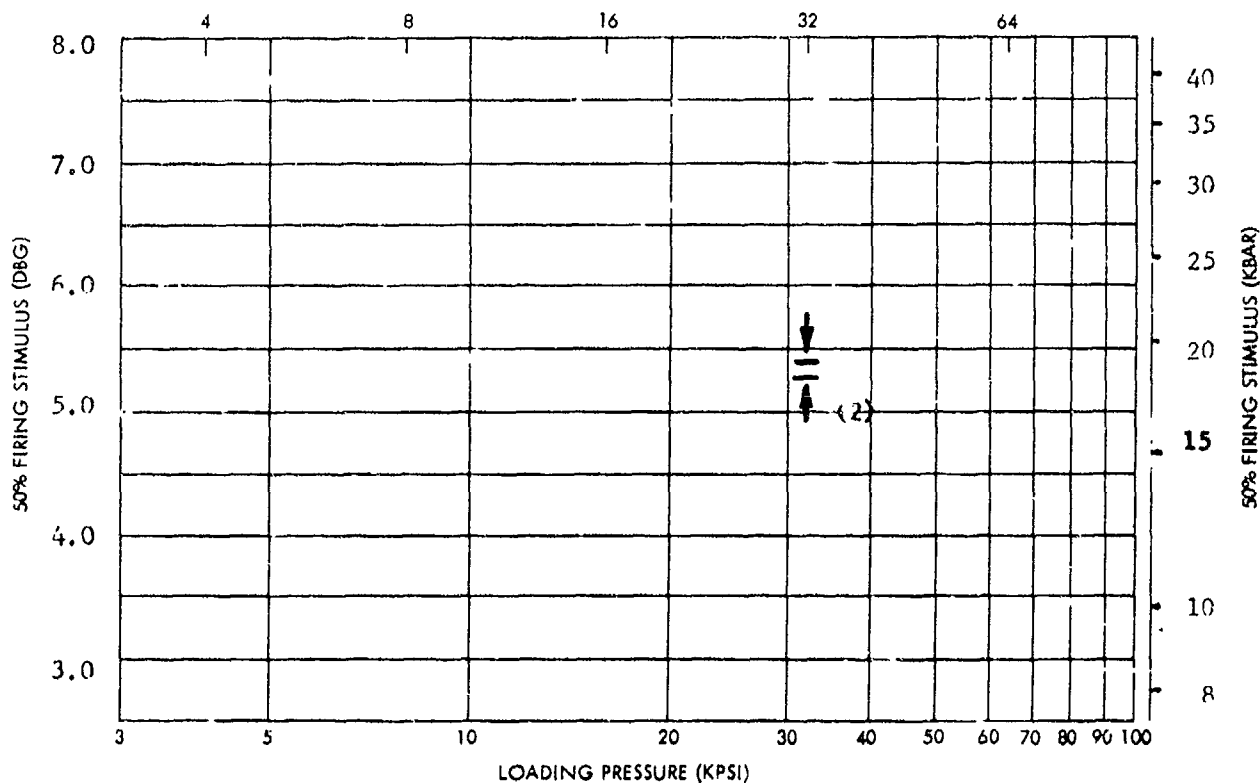
D 7 h 2

4 Sep 1973

|           |        |           |             |              |       |
|-----------|--------|-----------|-------------|--------------|-------|
| EXPLOSIVE | HNS-II | X NO.     | -           | Date of Test | 12/64 |
| TMD       | 1.74   | I. D. NO. | See Remarks |              |       |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS   |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|-----------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |           |
| 32                      | 1.629                         | 0.0034 | 93.6  | 5.386             | -      | -              | 10 | Z613; (1) |
| 32                      | 1.639                         | 0.0038 | 94.2  | 5.351             | -      | -              | 9  | Z613; (1) |
| 32                      | 1.639                         | 0.0034 | 94.2  | 5.295             | 0.0206 | 0.0287         | 10 | Z614      |
| 32                      | 1.644                         | 0.0044 | 94.5  | 5.340             | -      | -              | 10 | Z615; (1) |
| 32                      | 1.623                         | 0.0035 | 93.3  | 5.412             | 0.0147 | 0.0314         | 10 | Z616      |
| 32                      | 1.635                         | 0.0047 | 94.0  | 5.312             | -      | -              | 10 | Z618; (1) |

- (1) No mixed response zone.
- (2) Range indicated gives minimum and maximum sensitivity value observed from above table.



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II

X NO.:            ID:            Z NO.: \*            SSGT LOAD ORDER NO.: 1001-1006

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED:                      LOT NO.:

INITIAL QUANTITY:                      BATCH NO.:

MANUFACTURED BY:  
NOL: WO Division

IMPACT SENSITIVITY (1/4 or 500 point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

d =            cm

s =            log units

n =

Remarks

\*Z 612-HNS 6980-52\*\*  
46.6 grams

Z 613-HNS 6980-51\*\*  
36.0 grams

Z 614-HNS 6980-50\*\*  
45.9 grams

Z 615-HNS 6980-49\*\*  
24.8 grams

Z 616-HNS 6980-47\*\*  
29.5 grams

Z 618-Mixture of 4 grams  
each of Z 616, Z 614,  
Z 613, Z 612

\*\*Identification refers to  
NOL Project Notebook & Page  
Number





EXPLOSIVE HNS-II X NO. see remarks  
 TMD 1.74 I. D. NO. -

Date of Test  
 8/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS                            |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|------------------------------------|
|                         | AVG.                          | s      |       | AVG.              | n      | s <sub>m</sub> | N  |                                    |
| 32                      | 1.624                         | 0.0076 | 93.3  | 5.268             | 0.0634 | 0.0374         | 18 | Z-No. 710 (3)                      |
| 12                      | 1.634                         | 0.0060 | 92.9  | 5.366             | 0.0279 | 0.0209         | 20 | X No. 538                          |
| 32                      | 1.649                         | 0.0037 | 94.8  | 5.269             | 0.0546 | 0.0343         | 18 | X No. 567 (3)                      |
| 32                      | 1.536                         | 0.0042 | 94.0  | 5.186             | -      | -              | 19 | X No. 626;<br>I.D. No. 589, (1)(4) |
| 32                      | 1.630                         | 0.0047 | 93.7  | 5.239             | 0.0251 | 0.0173         | 20 | I.D. No. 795; #1 (5)               |
| 32                      | 1.628                         | 0.0036 | 93.6  | 5.230             | 0.0281 | 0.0195         | 23 | I.D. No. 795; #2 (5)               |

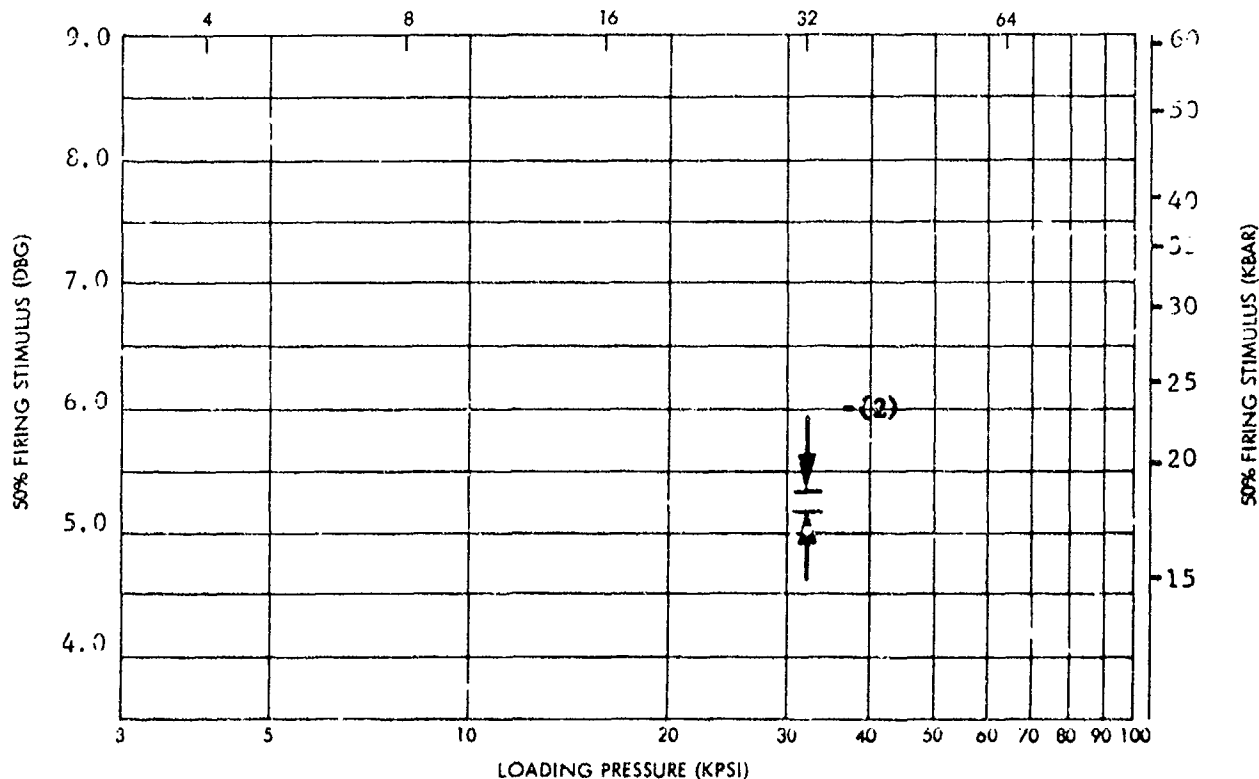
(1) No mixed response zone.

(2) Range indicate given minimum and maximum sensitivity value observed from the above table.

(3) Date of test - 10/66

(4) Date of test - 10/67

(5) Date of test - 6/68



D8b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II

X NO.: \* ID: \* Z NO.: \* SSGT LOAD ORDER NO.: 1086

1154

SOURCE:

1155

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 1: Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

|                                     |   |          |
|-------------------------------------|---|----------|
| *Z-710<br>(25 grams rec'd 10/12/66) | Explosive Tech. Inc.<br>Fairfield, Calif. | Lot S-24 |
|-------------------------------------|---|----------|

|  |   |  |
|--|---|--|
| X-538; Z-661<br>(90 grams rec'd 7/19/65) | NOL: WO Division<br>(Dr. J. Dacons,<br>F. Taylor) |  |
|--|---|--|

|                                    |   |   |
|------------------------------------|---|---|
| X 567<br>(25 pounds rec'd 4/25/66) | Chemtronics<br>Bee Tree Plant<br>Swannanoa, N. C. | (No. 60921-9060)<br>Lot 11138-8<br>$\bar{x}$ =80 cm, $s$ =0.10<br>$n$ =25 |
|------------------------------------|---|---|

|  |   |              |
|--|---|--------------|
| X 626; ID 589<br>(5 pounds rec'd 10/17/67) | Chemtronics<br>Bee Tree Plant<br>Swannanoa, N. C. | Lot 11138-18 |
|--|---|--------------|

|                                     |   |   |
|-------------------------------------|---|---|
| ID 795<br>(125 grams rec'd 6/18/68) | Chemtronics<br>Bee Tree Plant<br>Swannanoa, N. C. | Rec'd from Explosive<br>Tech. Inc. (Fairfield,<br>Calif.) Sample for<br>qualification test<br>ETI Lot S-27<br>Chemtronic Lot 11138-3. |
|-------------------------------------|---|---|

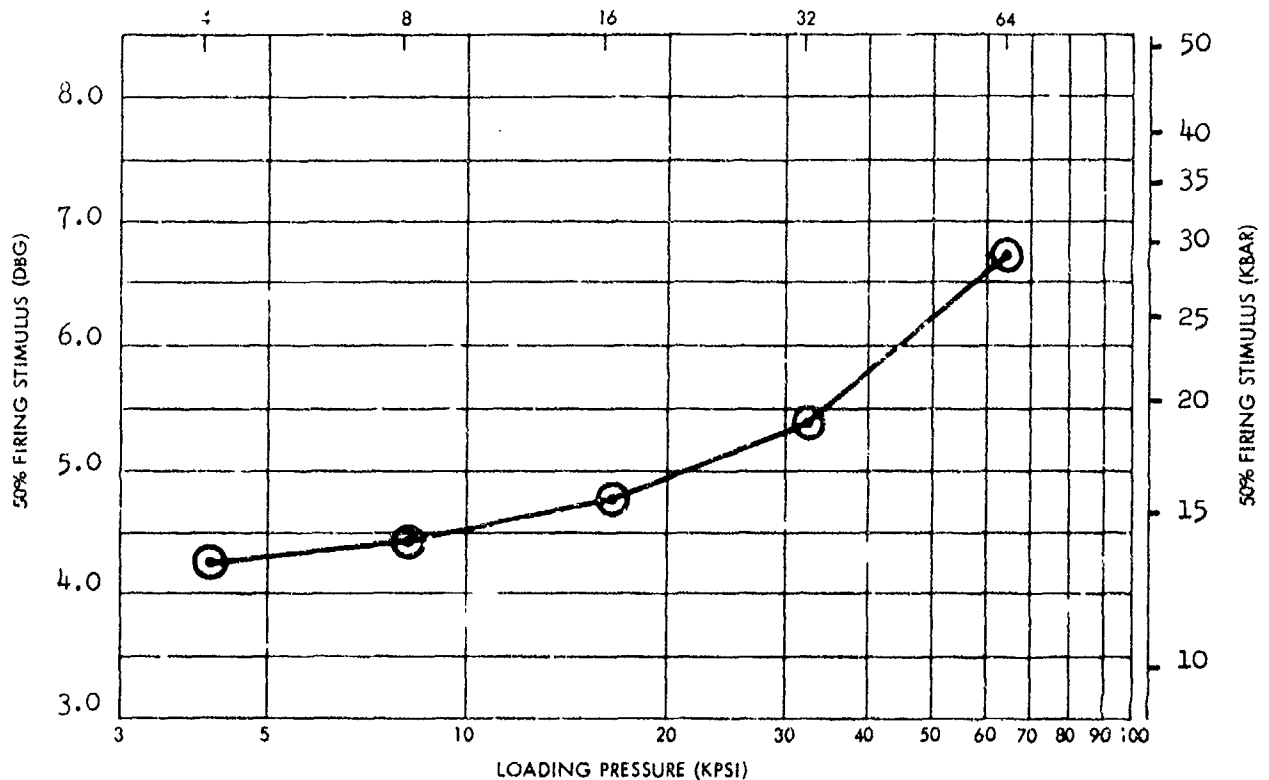
D 8 b 2

4 Sep 1973

|           |        |           |     |              |
|-----------|--------|-----------|-----|--------------|
| EXPLOSIVE | HNS-II | X NO.     | 528 | Date of Test |
| TMD       | 1.74   | I. D. NO. | -   | 12/64        |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.322                         | 0.0107 | 76.0  | 4.264             | 0.0084 | 0.0132         | 18 |         |
| 8                       | 1.423                         | 0.0073 | 81.8  | 4.444             | -      | -              | 18 | (1)     |
| 16                      | 1.545                         | 0.0044 | 88.8  | 4.767             | 0.0187 | 0.0243         | 18 |         |
| 32                      | 1.644                         | 0.0025 | 94.5  | 5.354             | 0.0168 | 0.0227         | 18 |         |
| 64                      | 1.725                         | 0.0018 | 99.1  | 6.684             | 0.0354 | 0.0274         | 18 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II

D8c1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II

X NO.: 528\* ID: Z NO.: 649 SSGT LOAD ORDER NO.: 1007

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 5/24/65

LOT NO.: 96-7481-1

INITIAL QUANTITY: 4 pounds

BATCH NO.:

MANUFACTURED BY:  
NOL: WO Division

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST 2/6/65

s = 61 cm

s = 0.18 log units

n = 50

Remarks

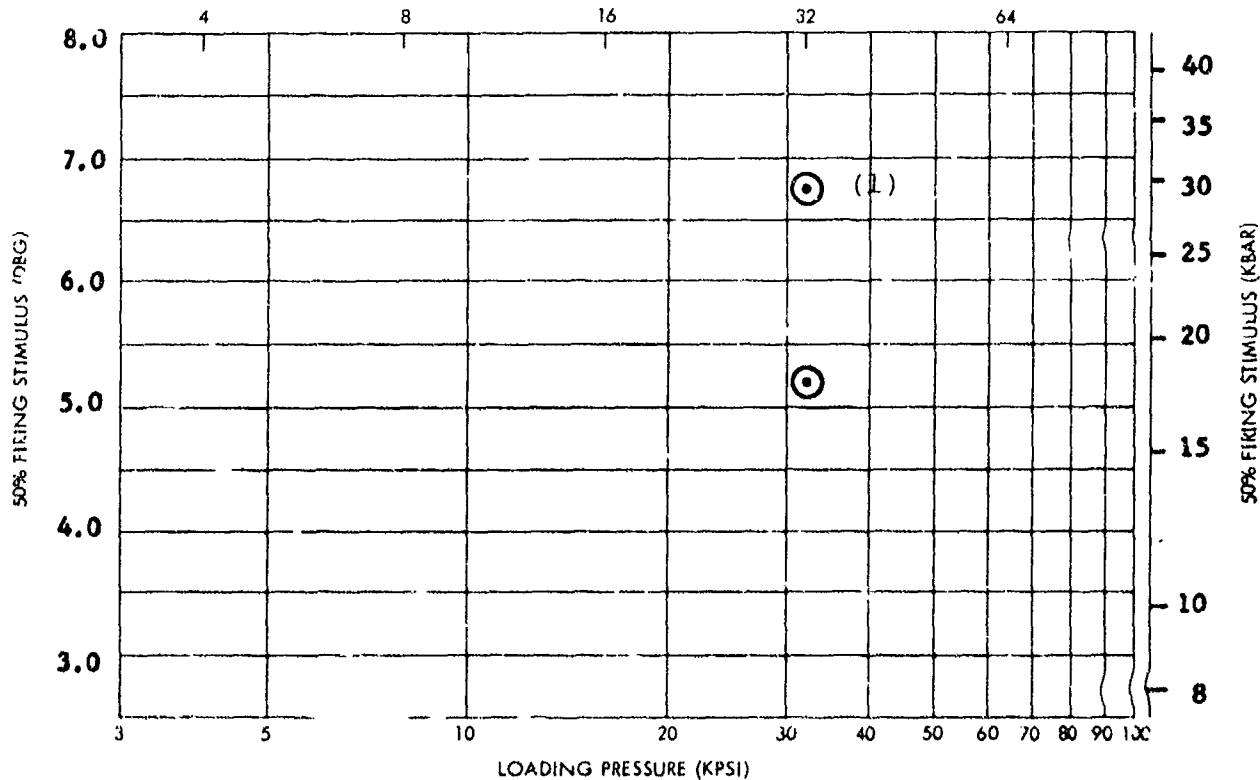
\*Blend of several bottles

|           |        |           |     |
|-----------|--------|-----------|-----|
| EXPLOSIVE | HNS-II | X NO.     | 550 |
| TMD       | 1.74   | I. D. NO. | -   |

Date of Test  
2/66

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 32                            | 1.627                            | 0.0041 | 93.5  | 5.192             | 0.0455 | 0.0258         | 23 |         |
| 32                            | 1.627                            | 0.0040 | 93.5  | 6.757             | 0.1761 | 0.0857         | 23 | (1)     |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) Tested at -315°F



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II

X NO.: 550      ID:              Z NO.: 674      SSGT LOAD ORDER NO.: 1099  
1113

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: 10/30/65              LOT NO.:

INITIAL QUANTITY: 1/2 pound              BATCH NO.:

MANUFACTURED BY:  
NOL: WO Division

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ =              cm

s =              log units

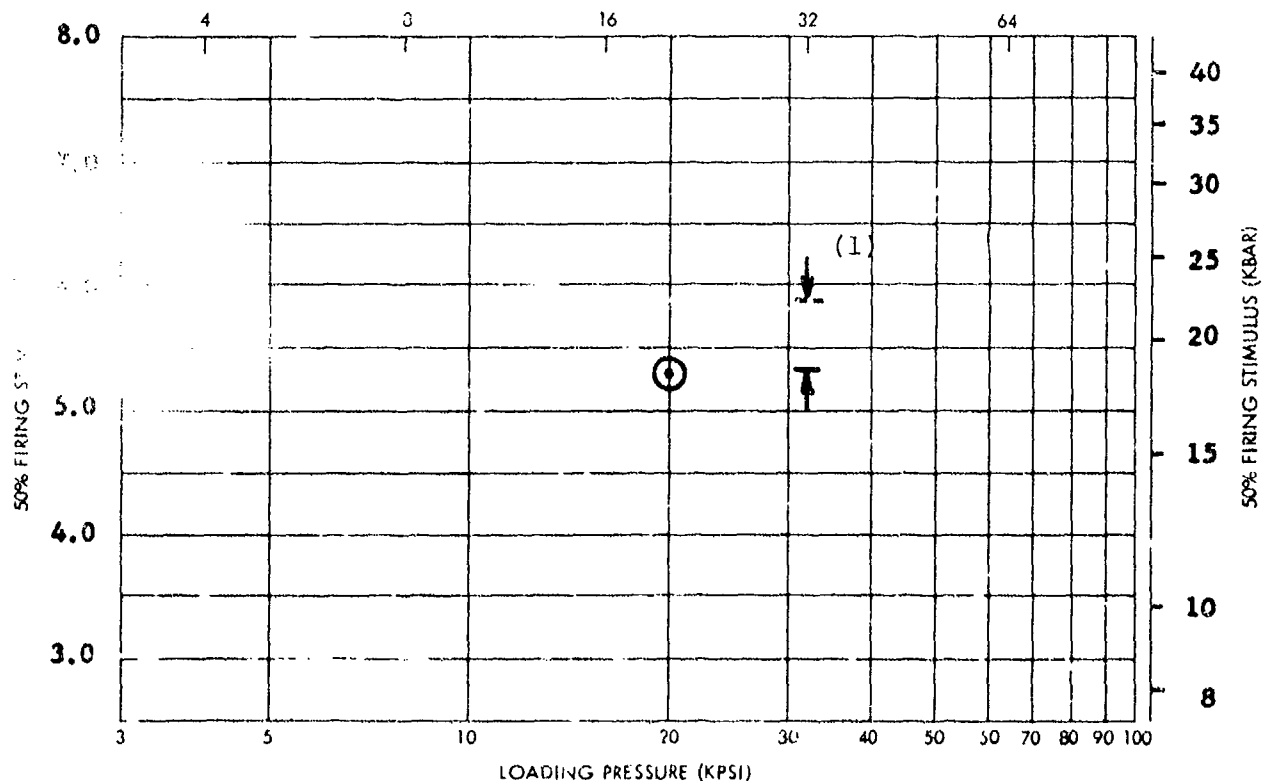
n =

Remarks  
HNS-I, recrystallized

|           |               |           |                    |
|-----------|---------------|-----------|--------------------|
| EXPLOSIVE | <b>HNS-II</b> | X NO.     | <b>See remarks</b> |
| TMD       | <b>1.74</b>   | I. D. NO. | <b>See remarks</b> |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |        |    | REMARKS                                  |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|--------|----|--|
|                         | AVG.                          | s      |       | AVG.              | $\rho$ | $s_m$  | N  |  |
| 20                      | 1.632                         | 0.0020 | 93.8  | 5.306             | 0.0102 | 0.0054 | 20 | Date of Test 1/71<br>X No. - ; ID 1259   |
| 32                      | 1.623                         | 0.0035 | 93.3  | 5.412             | 0.0147 | 0.0314 | 10 | Date of Test 6/68<br>X No. - ; ID 795    |
| 32                      | 1.671                         | 0.0021 | 96.0  | 5.878             | 0.0015 | 0.0010 | 23 | Date of Test 1/71<br>X No. 735; ID 1279  |
| 32                      | 1.628                         | 0.0039 | 93.6  | 5.322             | 0.0099 | 0.0051 | 20 | Date of Test 2/71<br>X No. 756; ID 1479  |
| 32                      | 1.633                         | 0.0021 | 93.9  | 5.539             | 0.0049 | 0.0029 | 20 | Date of Test 10/71<br>X No. 766; ID 1542 |
| 32                      | 1.646                         | 0.0038 | 94.6  | 5.480             | 0.0350 | 0.0230 | 20 | Date of Test 11/71<br>X No. 774; ID 1557 |

(1) Range indicated gives minimum and maximum sensitivity values observed from above table.



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II

D8e1

4 Sep 1973

## CHEMICAL DATA

EXPLOSIVE NAME: HNS-II

X NO.: \* ID: \* Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: 2,2',4,4',6,6' - Hexanitrostilbene

DATE RECEIVED: LOT NO.:

INITIAL QUANTITY: BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

## Remarks

\*ID 795

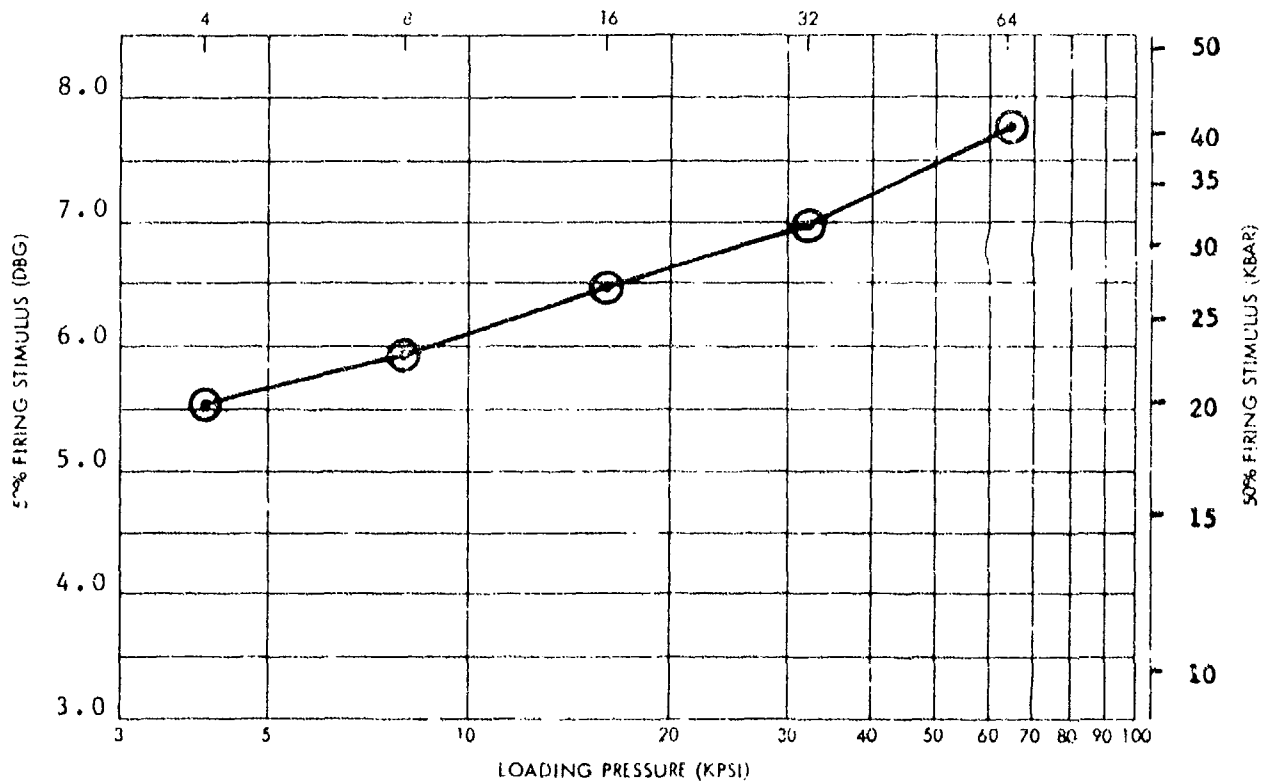
|  |   |   |
|--|---|---|
| X774; ID 1557<br>(Composite sample)                                | Chemtronics<br>Bee Tree Plant<br>Swannanoa, N. C. | (Lot 36-45)                             |
| IL 1259<br>(2 pounds rec'd 5/13/70)                                | Del Mar Eng. Lab<br>Los Angeles, Calif.           | Lot Del-310-135                         |
| X735; ID 1279<br>(14 pounds rec'd 6/10/70)                         | Ensign-Bickford Co.<br>Simsbury, Conn.            | (N60921-70-C-0206)<br>Lot FNB-1         |
| X756; ID 1479<br>(Composite sample of<br>100 grams rec'd 3/17/71)  | Del Mar Eng. Lab<br>Los Angeles, Calif.           | Lot 250-7<br>(Lot size -<br>186 pounds) |
| X766; ID 1542**<br>(Composite sample of<br>150 grams rec'd 9/9/71) | Chemtronics<br>Bee Tree Plant<br>Swannanoa, N. C. | (Lot 36-44)                             |

\*\*This material failed bulk density test of specification.  
It was recrystallized giving X774, Lot 36-45.



|           |                  |           |            |              |
|-----------|------------------|-----------|------------|--------------|
| EXPLOSIVE | <b>PICRAMIDE</b> | X NO.     | <b>405</b> | Date of Test |
| TMD       | <b>1.76</b>      | I. D. NO. | <b>-</b>   | <b>10/62</b> |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.389                         | 0.0033 | 78.9  | 5.549             | 0.0173 | 0.0169         | 20 |         |
| 8                       | 1.469                         | 0.0037 | 83.5  | 5.941             | 0.0218 | 0.0183         | 20 |         |
| 16                      | 1.562                         | 0.0034 | 88.8  | 6.470             | 0.0173 | 0.0167         | 20 |         |
| 32                      | 1.646                         | 0.0052 | 93.5  | 6.985             | 0.0320 | 0.0255         | 20 |         |
| 64                      | 1.719                         | 0.0028 | 97.7  | 7.783             | 0.0370 | 0.0324         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE CAP TEST (SSGT) DATA  
PICRAMIDE

D14a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PICRAMIDE

X NO.: 405 ID: Z NO.: 432 SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: 2,4,6 - Trinitroaniline

DATE RECEIVED: 8/23/62 LOT NO.: 694, 734

INITIAL QUANTITY: 300 grams BATCH NO.:

MANUFACTURED BY:  
Eastman Organic Chemicals

IMPACT SENSITIVITY (% or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\frac{1}{2}$  = cm

s = log units

n =

Remarks

D 14 a 2

4 Sep 1973

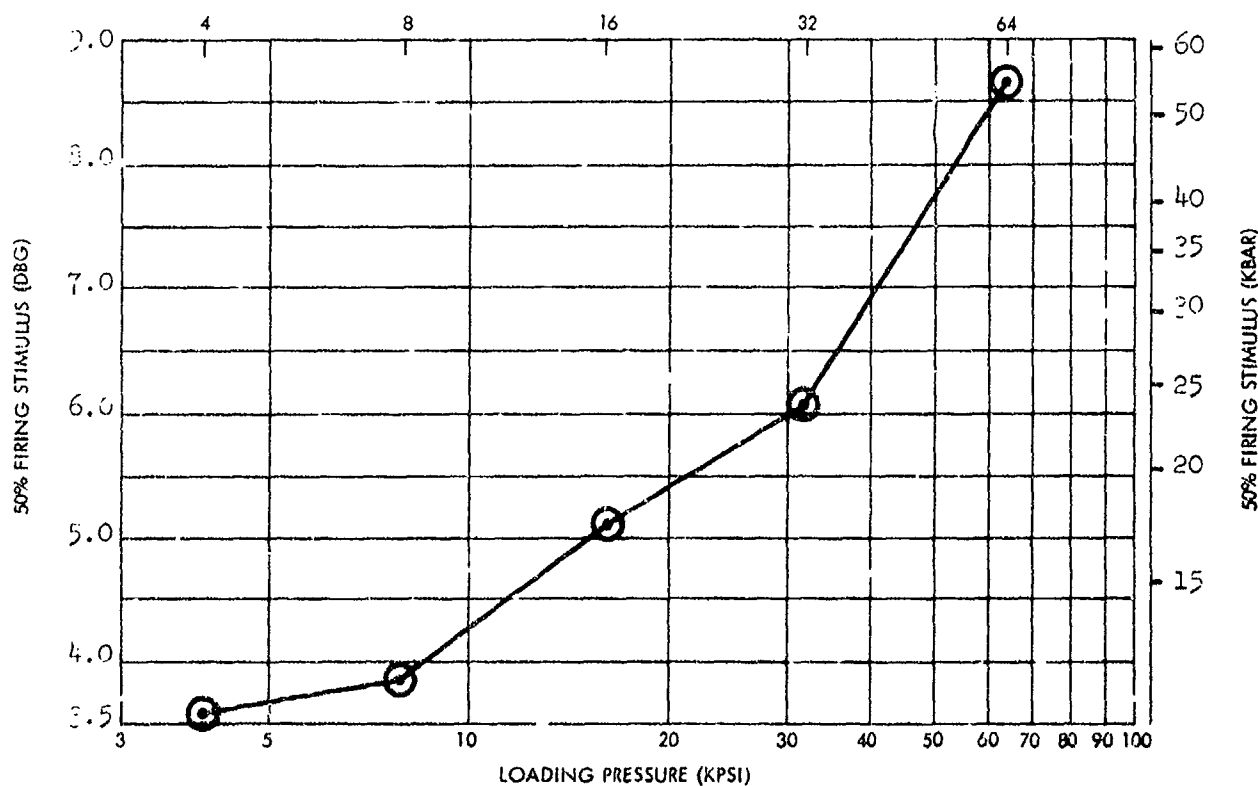
NOLTR 73-132

|           |      |           |     |
|-----------|------|-----------|-----|
| EXPLOSIVE | TNB  | X NO.     | 336 |
| TMD       | 1.69 | I. D. NO. | -   |

Date of Test  
5/61

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |       | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|-------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s     |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.239                         | 0.007 | 73.3  | 3.587             | -      | -              | 19 | (1)     |
| 8                       | 1.390                         | 0.008 | 82.2  | 3.343             | 0.2588 | 0.1643         | 20 |         |
| 16                      | 1.547                         | 0.005 | 91.5  | 5.118             | 0.0094 | 0.0075         | 20 |         |
| 32                      | 1.647                         | 0.003 | 97.5  | 6.102             | 0.0888 | 0.0502         | 20 |         |
| 64                      | (2)<br>1.692                  | 0.003 | 100.1 | 8.646             | 0.1500 | 0.0925         | 29 |         |

- (1) No mixed response zone  
(2) Experimental error



SMALL SCALE GAP TEST (SSGT) DATA  
TNB

D15a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TNB

X NO.: 336 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: Trinitrobenzene

DATE RECEIVED: LOT NO.:

INITIAL QUANTITY: BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

No information available

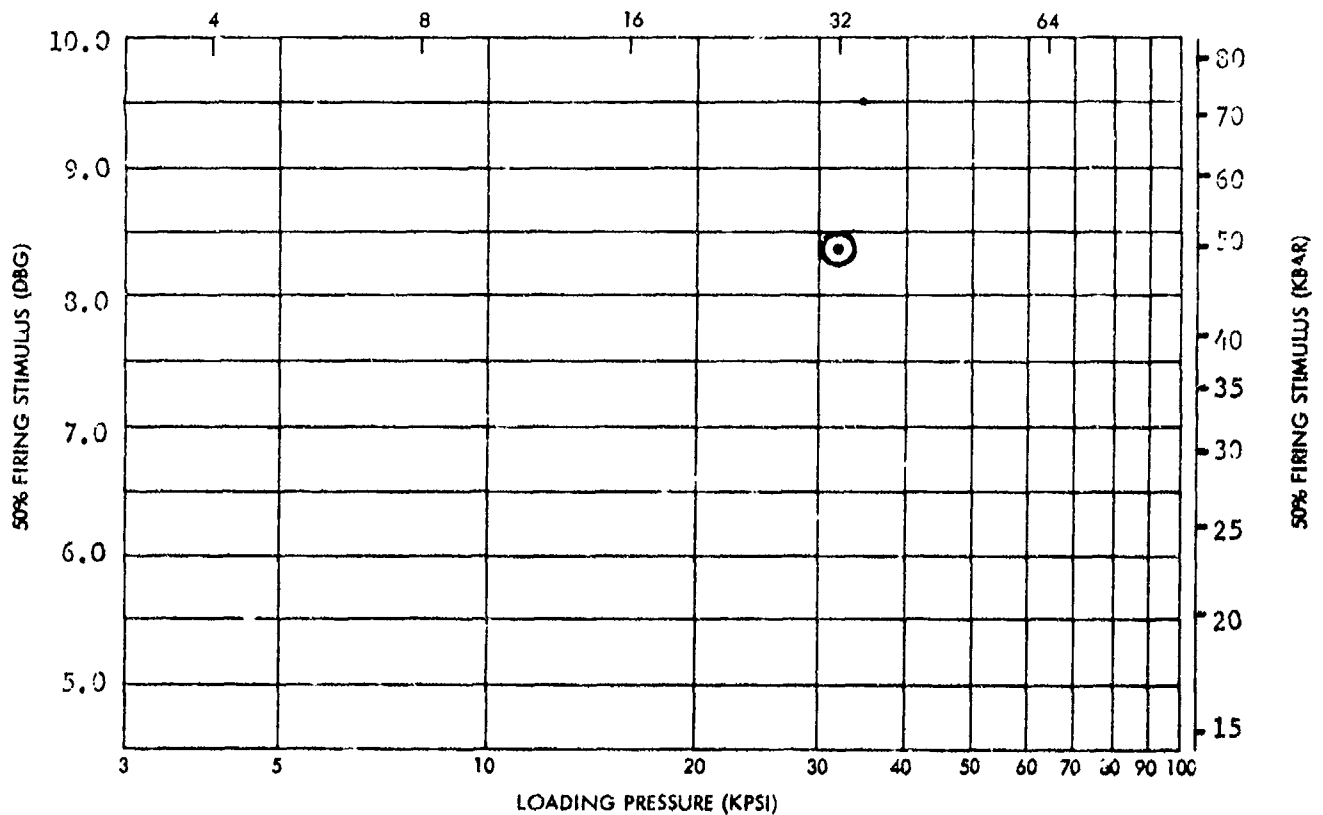
D15a2

4 Sep 1973

NOLTR 73-132

|           |                 |           |      |              |
|-----------|-----------------|-----------|------|--------------|
| EXPLOSIVE | DATB/BRL (95/5) | X NO.     | -    | Date of Test |
| TMD       | 1.84            | I. D. NO. | 2271 | 4/60         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 32                      | 1.685                         | 0.0031 | 91.6  | 8.382             | 0.0399 | 0.0192         | 46 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
DATB/BRL (95/5)

Elal

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATB/BRL (95/5)\*

X NO.:            ID:            Z NO.: 271            SSGT LOAD ORDER NO.: 659

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

Remarks

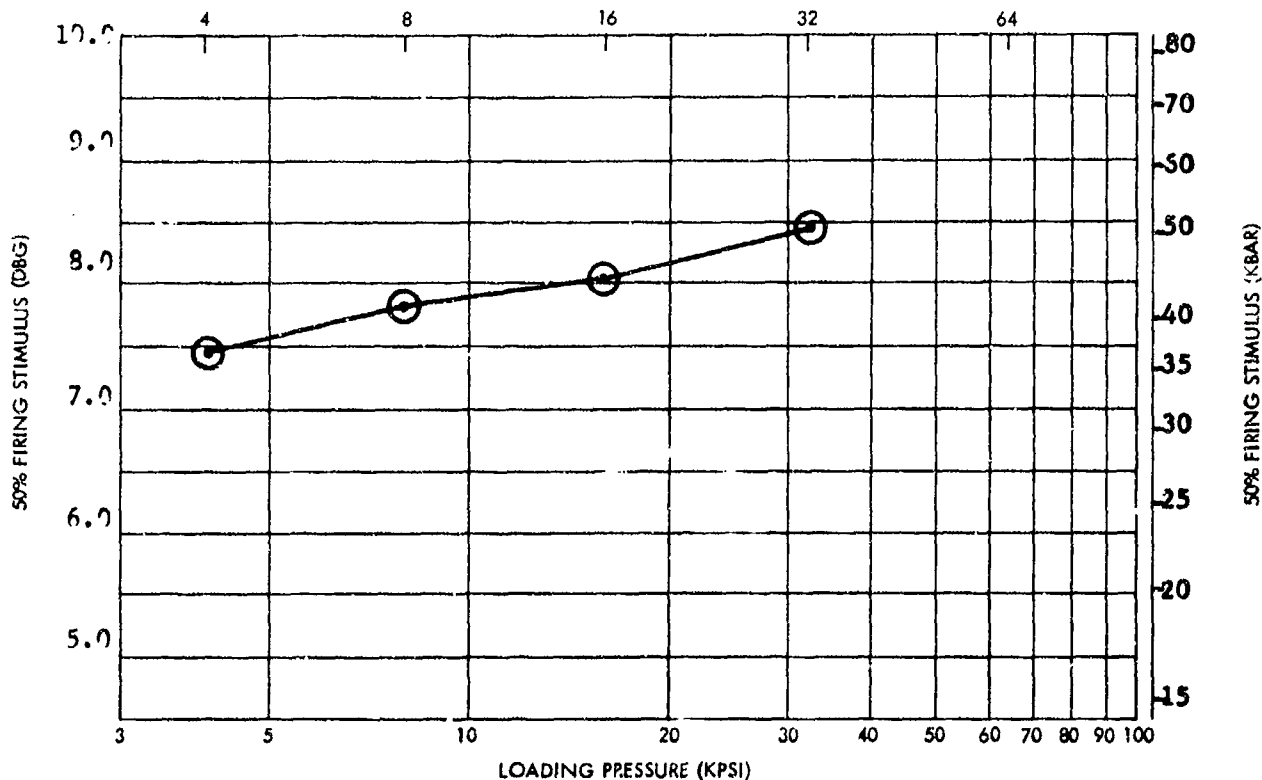
\*DATB blended with a laminac obtained from Ballistics Research Laboratory (BRL), Aberdeen, Maryland

NOLTR 73-132

|           |                   |           |     |              |
|-----------|-------------------|-----------|-----|--------------|
| EXPLOSIVE | DATE/ZYTEL (95/5) | X NO.     | 322 | Date of Test |
| TMD       | 1.78 (1)          | I. D. NO. | --  | 10/60        |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.210                         | 0.0072 | 68.0  | 7.476             | 0.0745 | 0.0612         | 12 |         |
| 8                       | 1.366                         | 0.0020 | 5.7   | 7.791             | --     | --             | 8  | (2)     |
| 16                      | 1.534                         | 0.0045 | 86.2  | 8.052             | 0.1247 | 0.0973         | 10 |         |
| 32                      | 1.557                         | 0.0028 | 93.1  | 8.479             | 0.0680 | 0.0646         | 8  |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

- (1) TMD computed and based on the density of DATB (1.84 gm/cm<sup>3</sup>) and Zytel-63 (1.08 gm/cm<sup>3</sup>).  
 (2) No mixed response zone.



SMALL SCALE GAP TEST (SSGT) DATA  
 DATB/ZYTEL (95/5)

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: DATB/ZYTEL (95/5) \*

X NO.: 322 ID: Z NO.: 366 SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 7/15/60

LOT NO.:

INITIAL QUANTITY: 600 pounds  
(molding powder)

BATCH NO.:

MANUFACTURED BY:

NPP, Indian Head, MD

IMPACT SENSITIVITY (1/2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

\*DATB X No. 315, coated.

|                             | Batch 1 | Batch 2 |
|-----------------------------|---------|---------|
| Bulk Density (g/ml)         | 0.37    | 0.36    |
| Vacuum Stability (ml/g/hr)  | 0.14    | 0.18    |
| Particle size               |         |         |
| (microscopic count, $\mu$ ) | 10.6    | 10.6    |
| (sub-sieve size, $\mu$ )    | 4.0     | 4.0     |
| Melting Point (°C)          | 286     | 284     |
| Pressed Density (g/ml)      | 1.62    | 1.61    |
| Batch Weight (pounds)       | 200     | 400     |



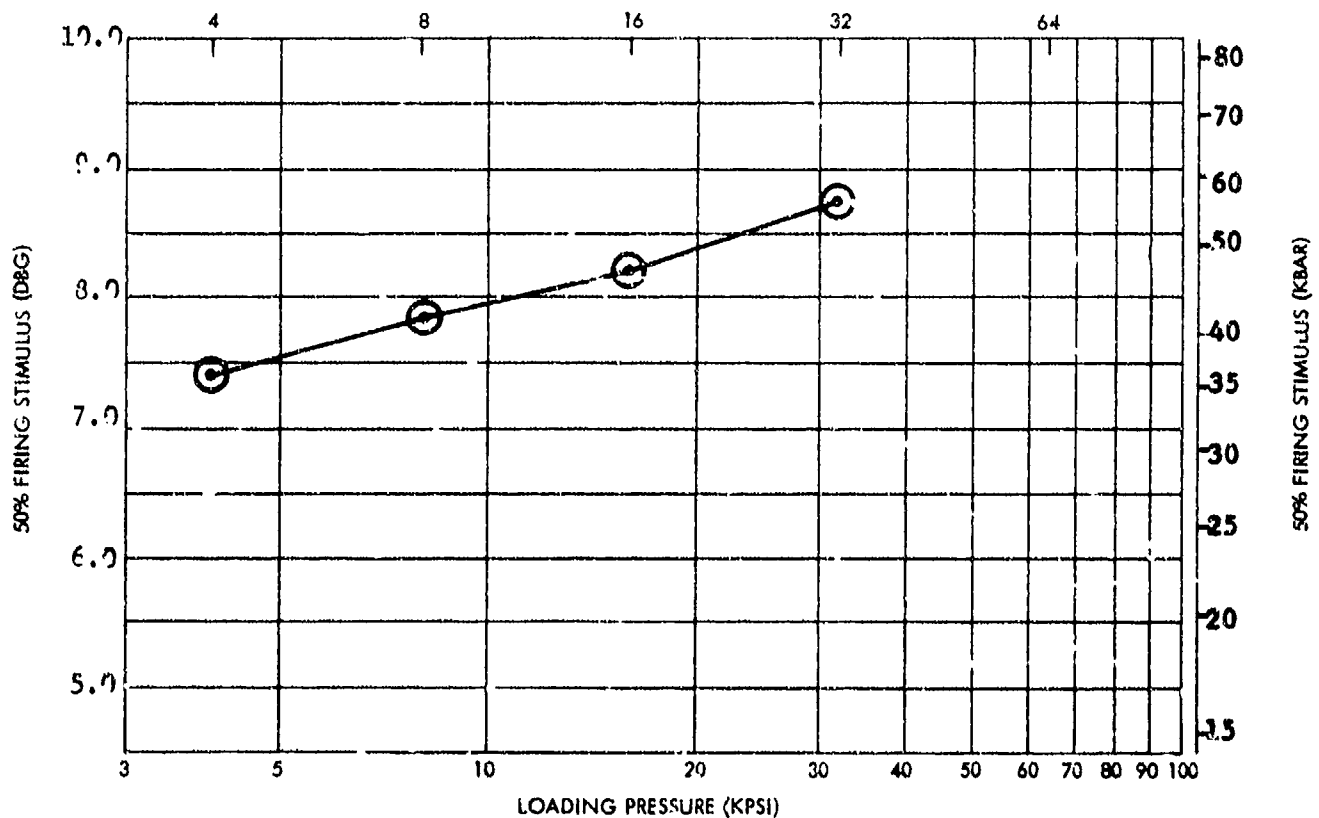
EXPLOSIVE **DATB/ZYTEL (95/5)**  
TMD **1.78 (1)**

X NO. **327**  
I. D. NO. **--**

Date of Test  
**12/60**

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.192                         | 0.0110 | 67.0  | 7.470             | 0.0096 | 0.0108         | 12 |         |
| 8                       | 1.358                         | 0.0033 | 76.3  | 7.811             | --     | --             | 8  | (2)     |
| 16                      | 1.529                         | 0.0034 | 85.9  | 8.200             | 0.0344 | 0.0301         | 10 |         |
| 32                      | 1.661                         | 0.0023 | 93.3  | 8.750             | 0.0394 | 0.0499         | 8  |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

- (1) TMD computed and based on the density of DATB (1.84 gm/cm<sup>3</sup>) and Zytel-63 (1.08 gm/cm<sup>3</sup>).  
(2) No fixed response zone.



SMALL SCALE GAP TEST (SSGT) DATA  
DATB/ZYTEL (95/5)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATB/ZYTEL (95/5)

X NO.: 327      ID:      Z NO.: 374      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:      LOT NO.:

INITIAL QUANTITY: 120 grams      BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (1/2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

1/2 =      cm

s =      log units

n =

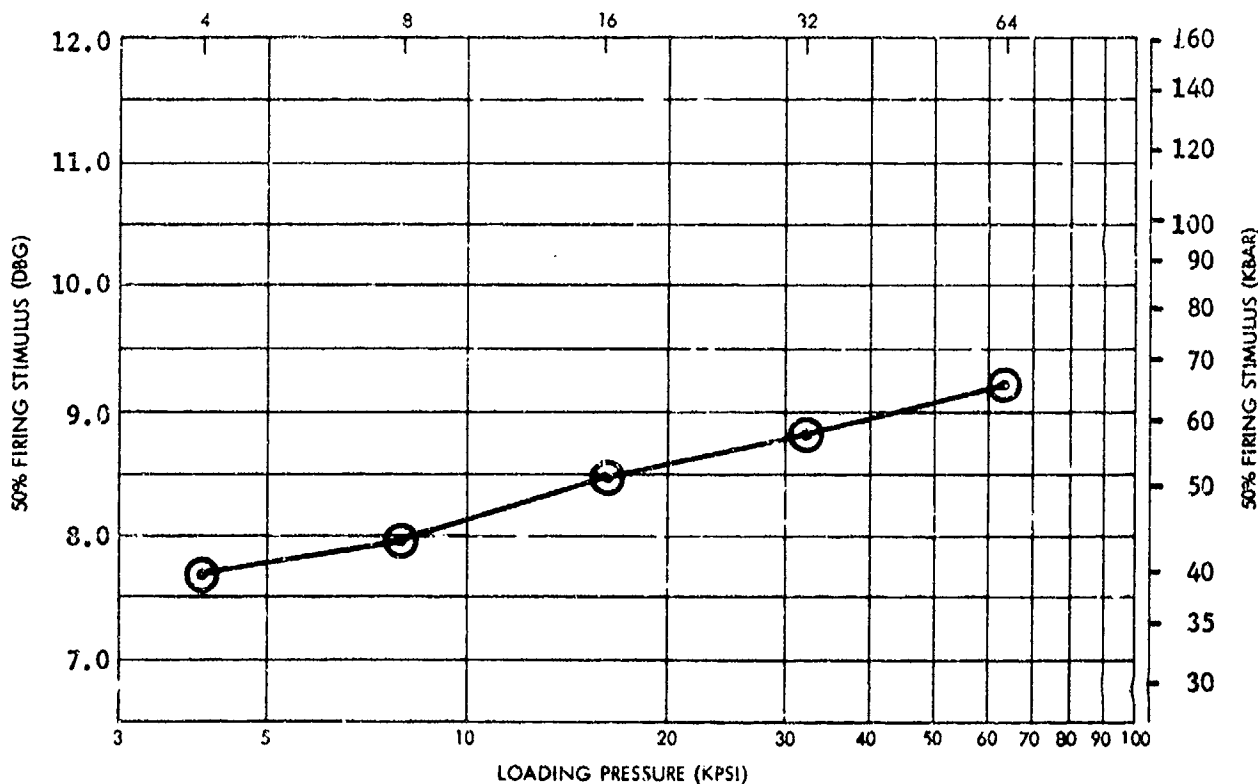
Remarks

|           |                           |           |            |                              |
|-----------|---------------------------|-----------|------------|------------------------------|
| EXPLOSIVE | <b>DATB/ZYTEL (90/10)</b> | X NO.     | <b>326</b> | Date of Test<br><b>11/60</b> |
| TMD       | <b>1.72 (1)</b>           | I. D. NO. | <b>-</b>   |                              |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.167                         | 0.0071 | 67.8  | 7.712             | -      | -              | 10 | (2)     |
| 8                       | 1.342                         | 0.0125 | 78.0  | 7.974             | 0.0206 | 0.0229         | 10 |         |
| 16                      | 1.512                         | 0.0017 | 87.9  | 8.449             | 0.0404 | 0.0373         | 10 |         |
| 32                      | 1.617                         | 0.0029 | 94.0  | 8.815             | 0.0767 | 0.0600         | 10 |         |
| 64                      | 1.676                         | 0.0020 | 97.4  | 9.235             | -      | -              | 10 | (2)     |
|                         |                               |        |       |                   |        |                |    |         |

(1) TMD computed and based on the density of DATB (1.84 gm/cm<sup>3</sup>) and Zytel-63 (1.08 gm/cm<sup>3</sup>)

(2) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
DATB/ZYTEL (90/10)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATB/ZYTEL (90/10)\*

X NO.: 326 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:  
NOL: WE Division

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

A = cm

s = log units

n =

Remarks

\*Made from X315 in two 15-pound batches, then blended.

## HNS-I/Teflon-30.

EXPLOSIVE (95/5)

X NO.

444

Date of Test  
3/64

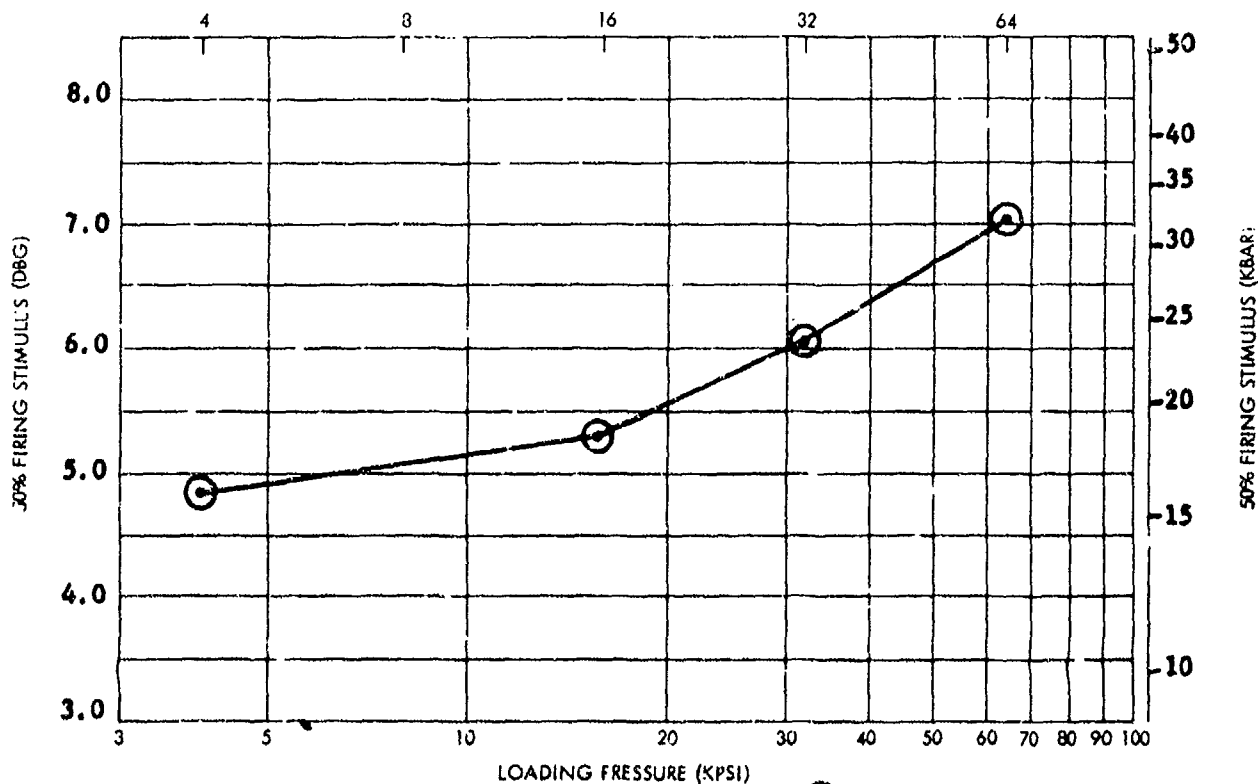
TMD 1.76

I. D NO.

--

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.410                            | 0.0048 | 80.1  | 4.851             | 0.0028 | 0.0041         | 18 |         |
| 16                            | 1.582                            | 0.0027 | 89.1  | 5.334             | --     | --             | 18 | (1)     |
| 32                            | 1.673                            | 0.0036 | 95.1  | 6.097             | 0.0223 | 0.0200         | 18 |         |
| 64                            | 1.729                            | 0.0045 | 98.2  | 7.012             | 0.0259 | 0.0261         | 18 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) No mixed response zone.

SMALL SCALE CIP TEST (SSGT) DATA  
HNS-I/Teflon-30 (95/5)

E4al

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-1/Teflon-30 (95/5)

X NO.: 444      ID:      L NO.:      SSGT LOAD ORDER NO.: 937 -  
940

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 12/30/63

LOT NO.: 25170-7/HNS/Teflon-30

INITIAL QUANTITY: 100 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
(H. Hellar)

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

f =      cm

s =      log units

n =

Remarks

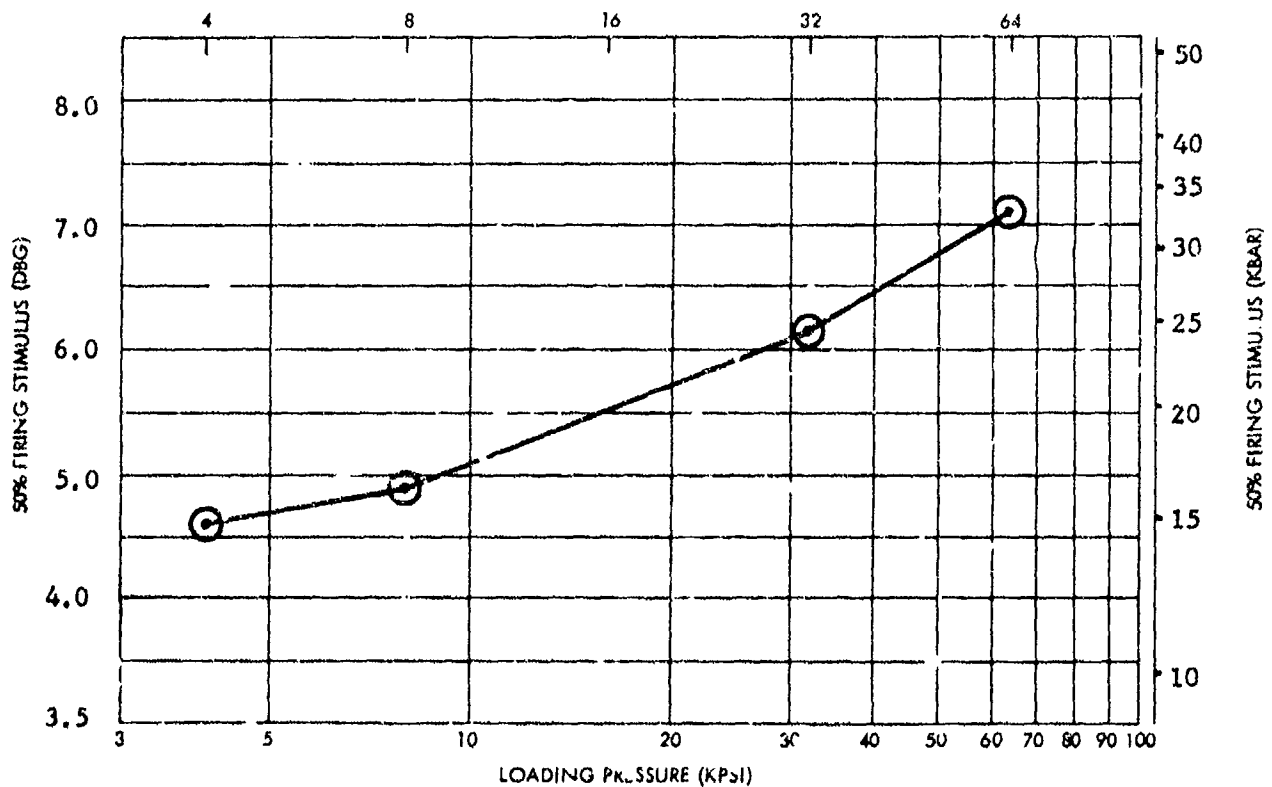
HNS-1/TEFLON-30,

|           |        |           |     |
|-----------|--------|-----------|-----|
| EXPLOSIVE | (95/5) | X NO.     | 467 |
| TMD       | 1.76   | I. D. NO. | -   |

Date of Test  
6/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.431                         | 0.0040 | 81.3  | 4.681             | 0.0586 | 0.0359         | 18 | (1)     |
| 8                       | 1.524                         | 0.0066 | 86.6  | 4.895             | 0.0284 | 0.0237         | 18 |         |
| 32                      | 1.690                         | 0.0021 | 96.0  | 6.139             | 0.0199 | 0.0233         | 18 |         |
| 64                      | 1.745                         | 0.0294 | 99.1  | 7.106             | 0.0857 | 0.0541         | 18 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of Test - 7/65



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-1/TEFLON-30(95/5)

E4b1

Change 1  
20 Dec 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: HNS-I\*/Teflon-30 (95/5)\*\*

X NO.: 467      ID:      Z NO.: 511      SSGT LOAD ORDER NO.: 941 &  
964

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 4/2/64

LOT NO.:

INITIAL QUANTITY: 103 grams

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST 6/14/64

NOL: WE Division

$\bar{x}$  = 65 cm

s = 0.12 log units

n = 25

Remarks

\*HNS-I derived from  
HNS-RX420 (needles)  
American Cyanamide  
NOLW 6705-75  
\*\*Blended; dried @ 200°C

E 4 b 2

4 Sep 1973



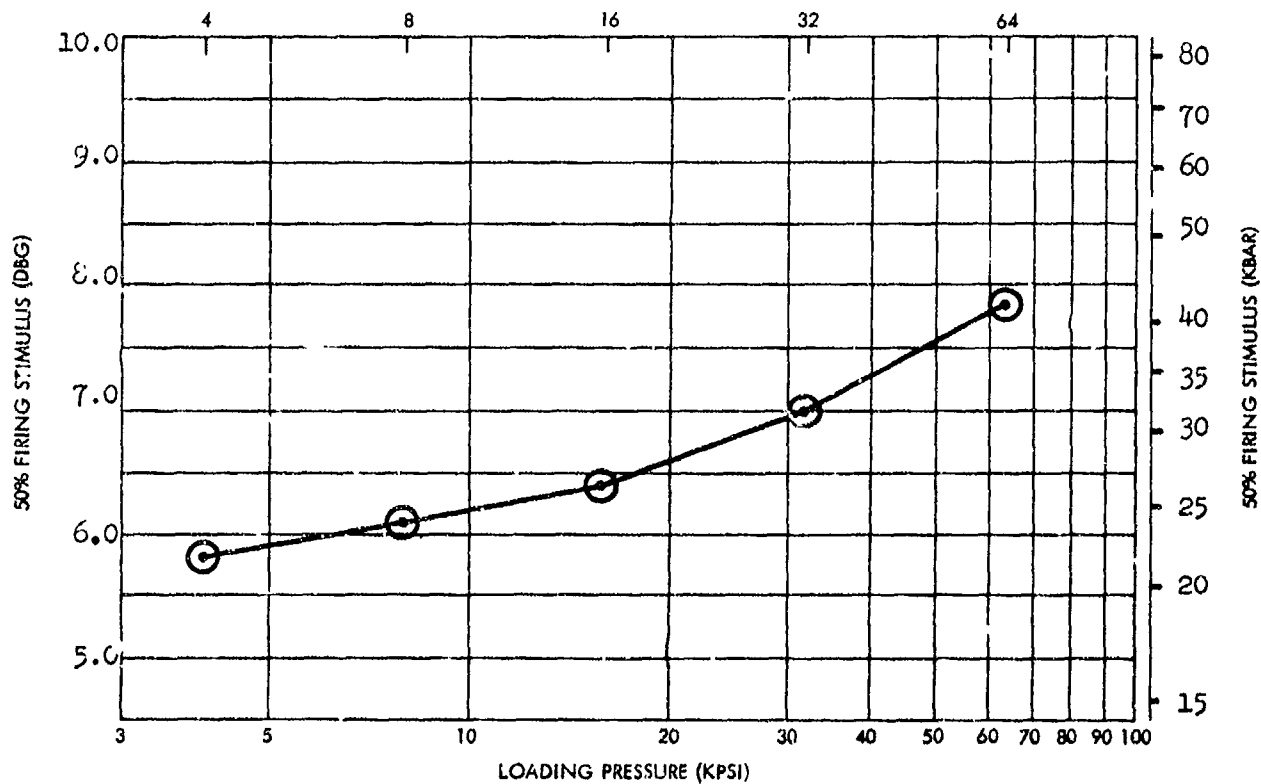
NOLTR 73-132

HNS-I/TEFLON-30,  
EXPLOSIVE (95/5)  
TMD 1.76

X NO. 525  
I. D. NO. -

Date of Test  
5/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |               |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|---------------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g             | s <sub>m</sub> | N  |         |
| 4                       | 1.278                         | 0.0039 | 72.6  | 5.824             | 0.0398        | 0.0267         | 23 |         |
| 8                       | 1.391                         | 0.0043 | 79.0  | <b>6.105</b>      | <b>0.0482</b> | <b>0.0290</b>  | 23 |         |
| 16                      | 1.526                         | 0.0028 | 86.7  | 6.410             | 0.0174        | 0.0247         | 23 |         |
| 32                      | 1.644                         | 0.0064 | 93.4  | 6.996             | <b>0.0056</b> | <b>0.0045</b>  | 23 |         |
| 64                      | 1.724                         | 0.0043 | 98.0  | 7.825             | 0.0638        | 0.0344         | 23 |         |
|                         |                               |        |       |                   |               |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-I/TEFLON-30, (95/5)

E4c1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I\*/TEFLON-30 (95/5)

X NO.: 525      ID:                      Z NO.: 648                      SSGT LOAD ORDER NO.: 1045-1048

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 5/17/65

LOT NO.: CH5962

INITIAL QUANTITY: 250 grams

BATCH NO.:

MANUFACTURED BY:  
NOL: WE Division  
Bldg 318

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = 72      cm

s = 0.14 log units

n = 25

Remarks

\* Made from HNS-I; XNo. 498



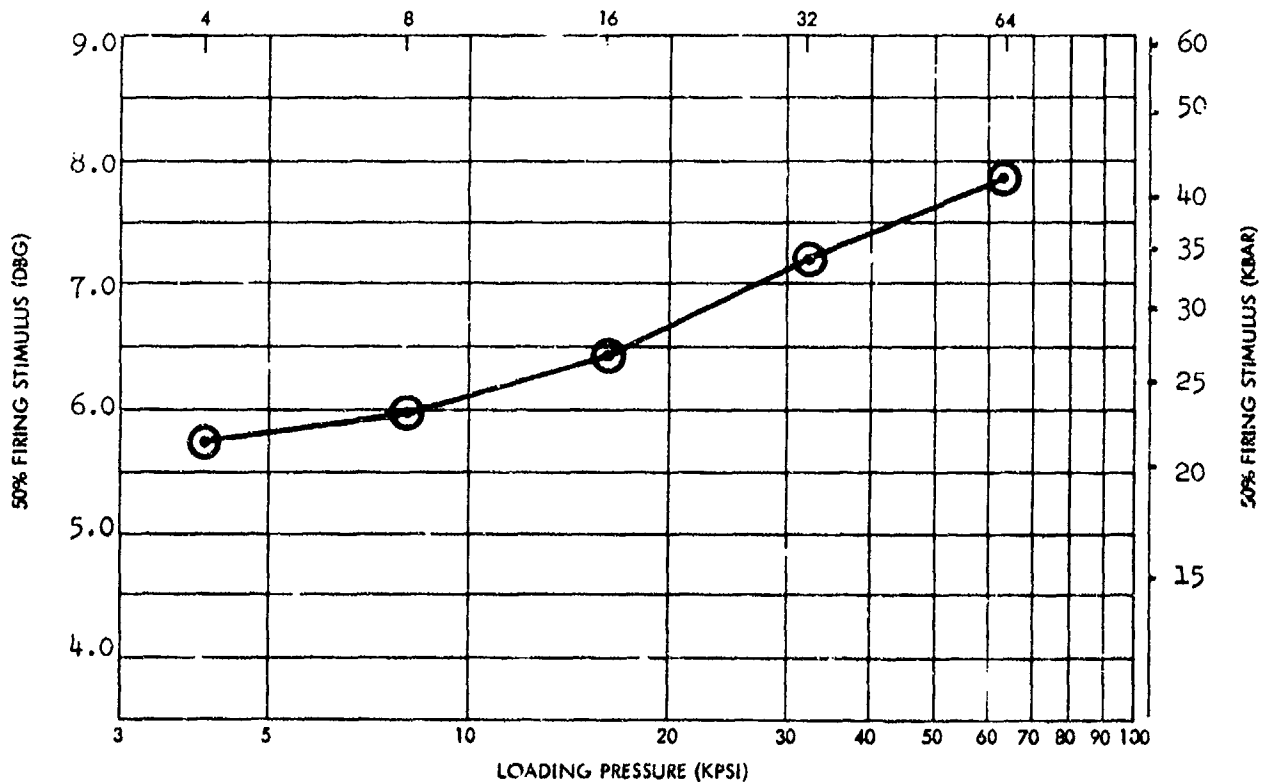
HNS-I/TEFLON-30<sub>2</sub>  
 EXPLOSIVE (95/5)  
 TMD 1.76

X NO. 526  
 I. D. NO. -

Date of Test  
 5/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.282                         | 0.0052 | 72.8  | 5.754             | 0.0060 | 0.0079         | 18 |         |
| 8                       | 1.388                         | 0.0027 | 78.9  | 5.970             | 0.0673 | 0.0437         | 18 |         |
| 16                      | 1.526                         | 0.0024 | 86.7  | 6.430             | -      | -              | 18 | (1)     |
| 32                      | 1.654                         | 0.0065 | 94.0  | 7.192             | 0.0333 | 0.0246         | 18 |         |
| 64                      | 1.723                         | 0.0032 | 97.9  | 7.889             | 0.0263 | 0.0240         | 18 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mix response zone



SMALL SCALE GAP TEST (SSGT) DATA  
 HNS-I/TEFLON-30<sub>2</sub> (95/5)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I/TEFLON-30 (95/5)

X NO.: 526 ID: Z NO.: 644 SSGT LOAD ORDER NO.: 960-963

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 4/30/65

LOT NO.:

INITIAL QUANTITY: 450 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 618

IMPACT SENSITIVITY (% or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

DATE OF TEST

$\bar{x}$  = 83 cm

$s$  = 0.10 log units

$n$  = 25

Remarks

HNS-I/TEFLON-30,  
(95/5)

EXPLOSIVE

TMD

1.76

X NO.

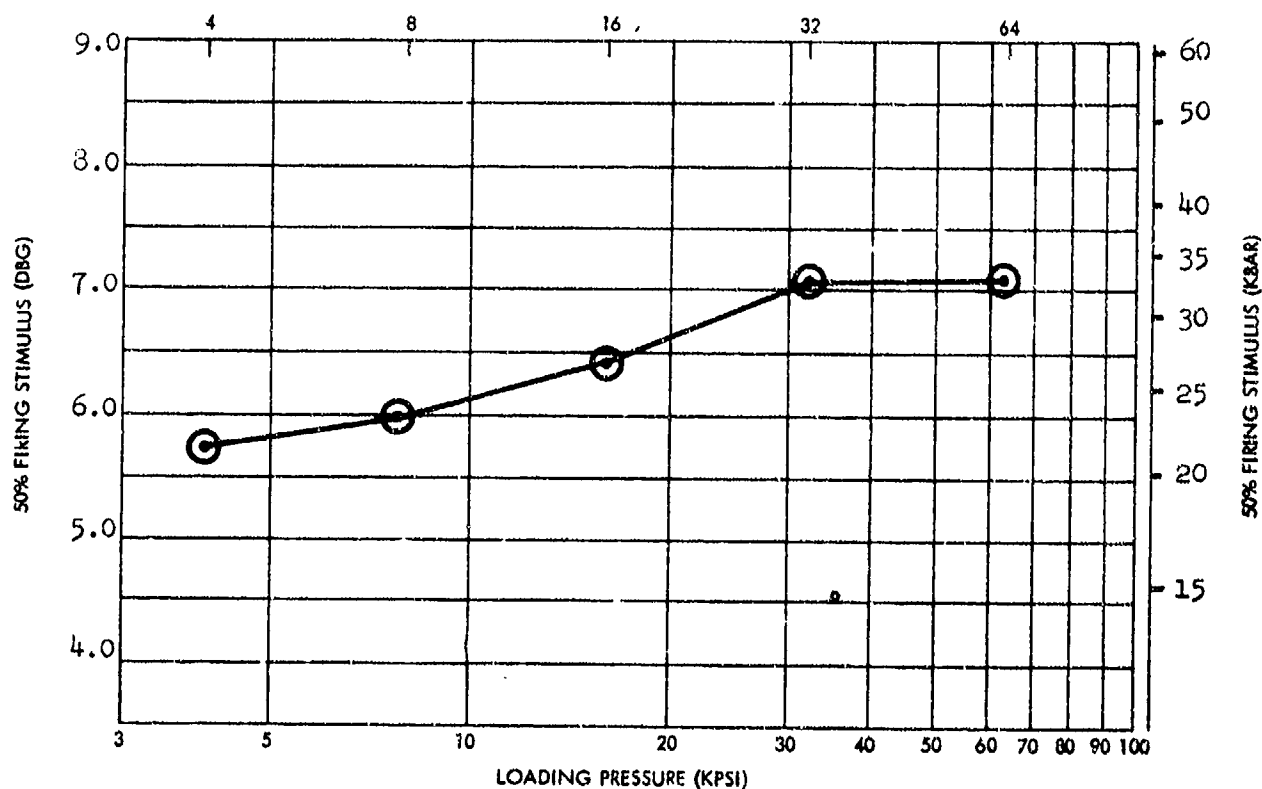
540

I. D. NO.

-

Date of Test  
8/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |               |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|---------------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g             | s <sub>m</sub> | N  |         |
| 4                             | 1.248                            | 0.0049 | 70.9  | 5.758             | 0.0251        | 0.0195         | 20 |         |
| 8                             | 1.359                            | 0.0051 | 77.2  | 5.991             | 0.0206        | 0.0142         | 20 |         |
| 16                            | 1.500                            | 0.0027 | 85.2  | 6.436             | <b>0.0354</b> | <b>0.0279</b>  | 20 |         |
| 32                            | 1.631                            | 0.0034 | 92.7  | 7.088             | 0.0504        | 0.0308         | 20 |         |
| 64                            | 1.704                            | 0.0064 | 96.8  | 7.092             | <b>0.3585</b> | 0.1893         | 20 |         |
|                               |                                  |        |       |                   |               |                |    |         |

SMALL SCALE GAP TEST (SSGT) DATA  
HNS-I/TEFLON-30 (95/5)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-I/TEFLON-30 (25/5)

X NO.: 540 ID: Z NO.: SSGT LOAD ORDER NO.: 1082

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/11/65

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:  
NOL: WE Division  
Bldg 318  
(Greer)

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST 10/22/65

M = 65 cm

s = 0.23 log units

n =

Remarks

\*Made from HNS-I XNo. 498

NOLTR 73-132

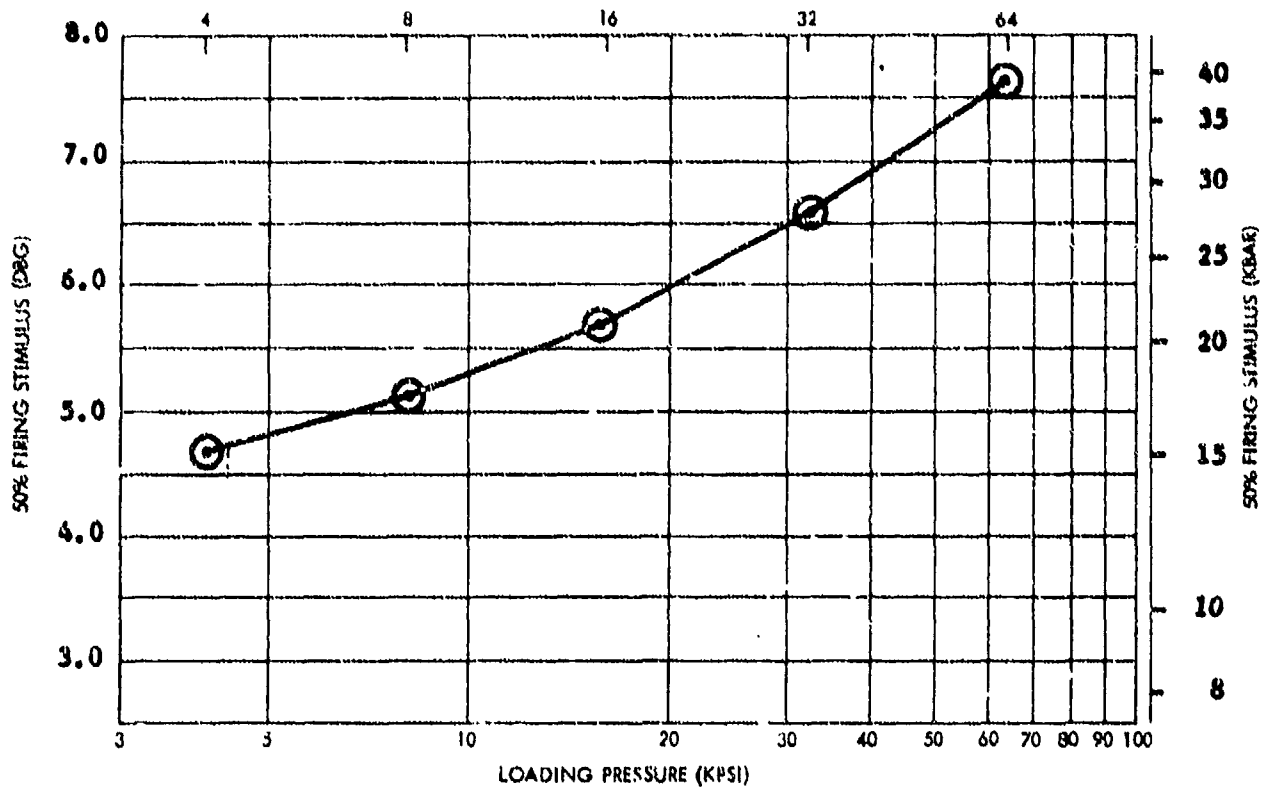
HNS-II/TEFLON-30

EXPLOSIVE (90/10)  
TMD 1.78

X NO. 571  
I. D. NO. -

Date of Test  
6/66

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (D&G) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | u      | u <sub>m</sub> | N  |         |
| 4                       | 1.540                         | 0.0054 | 86.5  | 4.685             | 0.0307 | 0.0234         | 18 |         |
| 8                       | 1.609                         | 0.0055 | 90.4  | 5.114             | 0.0180 | 0.0178         | 18 |         |
| 16                      | 1.692                         | 0.0063 | 95.1  | 5.673             | 0.0162 | 0.0151         | 18 |         |
| 32                      | 1.742                         | 0.0052 | 97.5  | 5.588             | 0.0199 | 0.0241         | 18 |         |
| 64                      | 1.769                         | 0.0024 | 99.4  | 7.642             | 0.0399 | 0.0362         | 18 |         |



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-30, (90/10)

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: HNS-II\*/TEFLON-30 (90/10)

X NO.: 571 ID: Z NO.: SSGT LOAD ORDER NO.: 1133

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 6/17/66

LOT NO.:

INITIAL QUANTITY: 6 pounds

BATCH NO.: 3

MANUFACTURED BY:

NOL: WE Division  
(H. Hellar)

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

DATE OF TEST

|     | I     | II    |
|-----|-------|-------|
| s = | 70 cm | 94 cm |

s = .18 log units 0.05 log units

n =

Remarks

\*HNS-II B (X567; see D8b)  
purchased from Chemtronics  
(formerly Northrup Carolina):  
Lot 11138-8.  
NOL Contract N60921-9060



NOLTR 73-132

HNS-II/TEFLON-30

EXPLOSIVE

(90/10)

X NO.

571

Date of Test

TMD

1.78

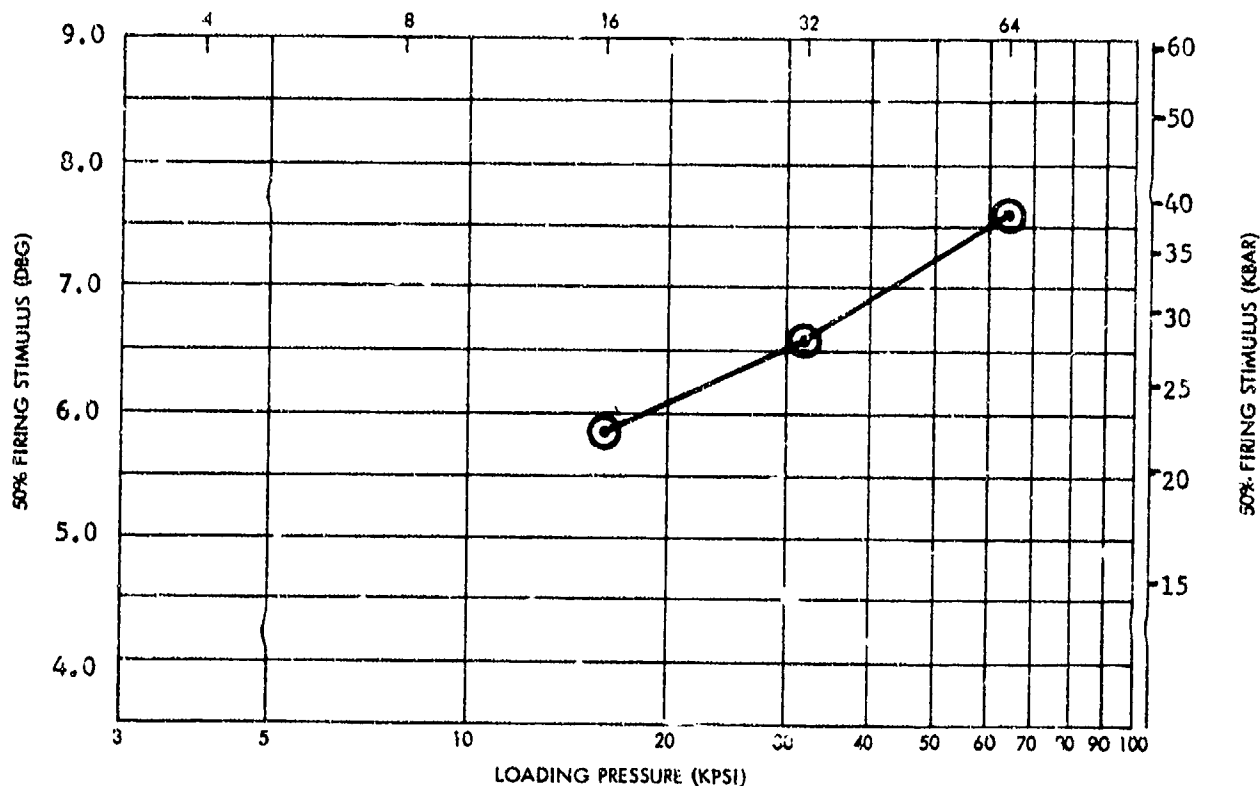
I. D. NO.

-

6/66

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 16                            | 1.696                            | 0.0081 | 95.3  | 5.850             | 0.0878 | 0.0548         | 18 |         |
| 32                            | 1.744                            | 0.0041 | 98.0  | 6.576             | -      | -              | 13 | (1)     |
| 64                            | 1.769                            | 0.0055 | 99.4  | 7.591             | 0.0807 | 0.0614         | 13 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-30(90/10)

E5b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II\*/TEFLON-30 (90/10)

X NO.: 571 ID: Z NO.: SSGT LOAD ORDER NO.: 1134

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 6/17/66

LOT NO.:

INITIAL QUANTITY: 6 pounds

BATCH NO.: 3

MANUFACTURED BY:

NOL: WE Division  
(H. Hellar)

IMPACT SENSITIVITY (§ or 50+ point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

DATE OF TEST

|     | I     | II    |
|-----|-------|-------|
| s = | 70 cm | 94 cm |

s = 0.18 log units 0.05 log units

n =

Remarks

\*HNS-II B (X567; see D8b)  
purchased from Chemtronics  
(formerly Northrup Carolina):  
Lot 11138-8.  
NOL Contract N60921-9060

NOLTR 73-132

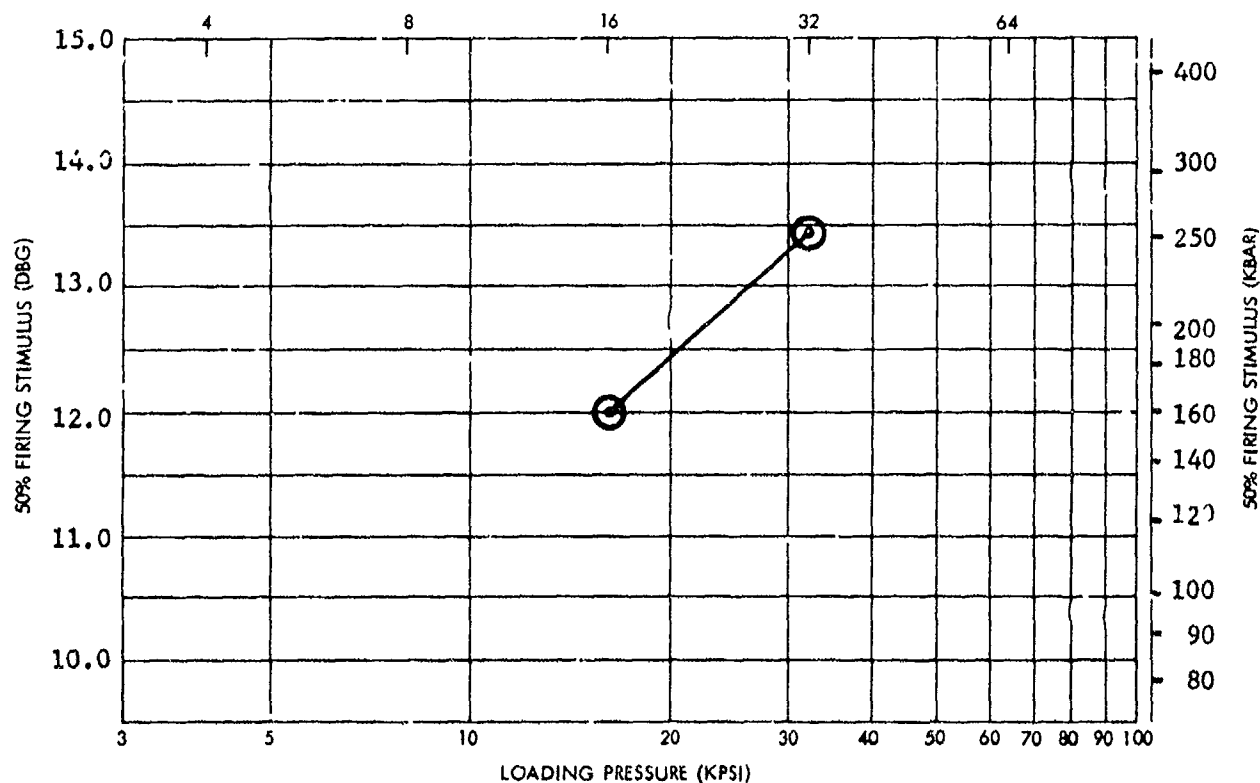
HNS-II/TEFLON-30

|           |         |           |     |
|-----------|---------|-----------|-----|
| EXPLOSIVE | (90/10) | X NO.     | 571 |
| TMD       | 1.78    | I. D. NO. | -   |

Date of Test  
7/66

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 16                            | 1.690                            | 0.0043 | 94.9  | 12.00             | 0.4059 | 0.2789         | 18 | (1)     |
| 32                            | 1.739                            | 0.0035 | 97.7  | 13.43             | 1.185  | 0.6233         | 17 | (1)     |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) Tested at -315°F



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-30(90/10)

E5 c1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II\*/TEFLON-30 (90/10)

X NO.: 571 ID: Z NO.: SSGT LOAD ORDER NO.: 1139

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 6/17/66

LOT NO.:

INITIAL QUANTITY: 6 pounds

BATCH NO.: 3

MANUFACTURED BY:

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

NOL: WE Division  
(H. Hellar)

DATE OF TEST

|     | I     | II    |
|-----|-------|-------|
| s = | 70 cm | 99 cm |

s = 0.18 log units 0.05 log units

n =

Remarks

\*HNS-II B (X567; see D8b)  
purchased from Chemtronics  
(formerly Northrup Carolina):  
Lot 11138-8.  
NOL Contract N60921-9060

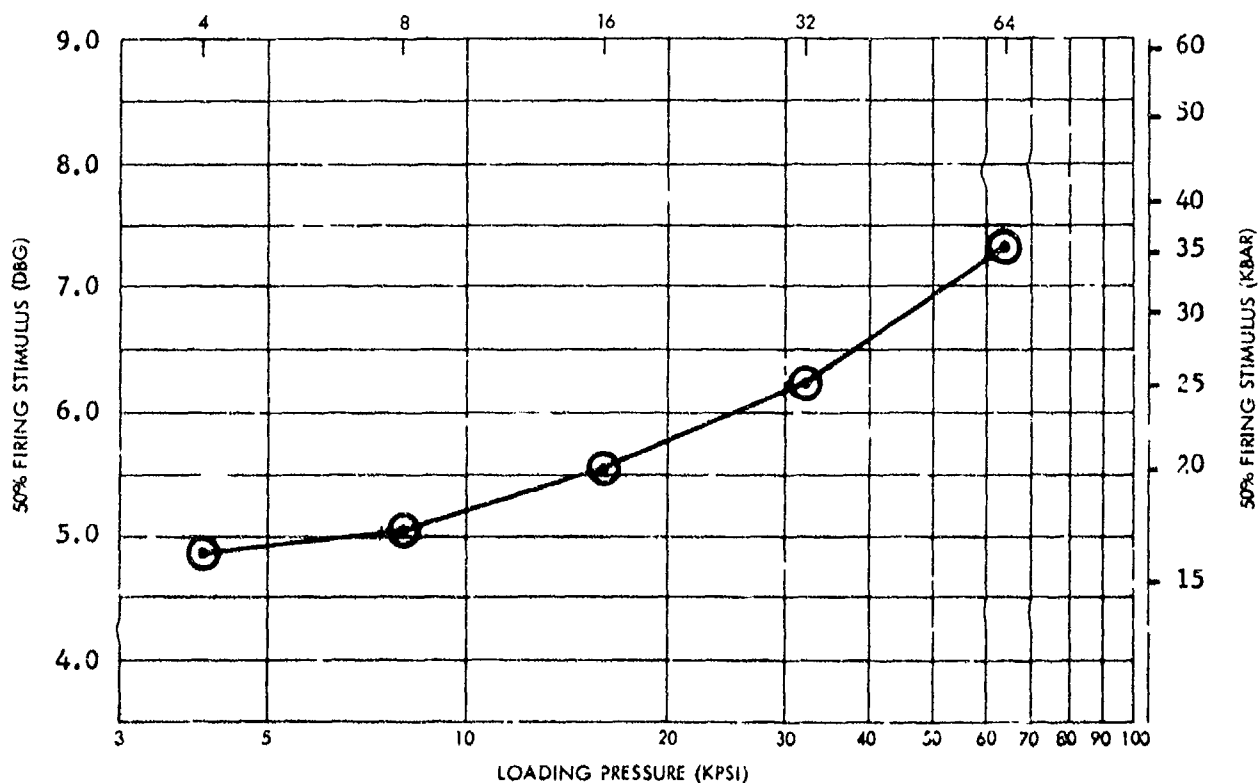
EXPLOSIVE **HNS-II/TEFLON-30,  
(90/10)**  
TMD **1.78**

X NO. **581**  
I. D. NO. **-**

Date of Test  
**1/67**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.427                            | 0.0025 | 80.2  | 4.853             | 0.0229 | 0.0245         | 18 |         |
| 8                             | 1.506                            | 0.0047 | 84.6  | 5.065             | 0.0292 | 0.0234         | 18 |         |
| 16                            | 1.618                            | 0.0035 | 90.9  | 5.551             | 0.0470 | 0.0323         | 18 |         |
| 32                            | 1.700                            | 0.0018 | 95.5  | 6.249             | -      | -              | 18 | (1)     |
| 64                            | 1.756                            | 0.0030 | 98.7  | 7.338             | 0.0226 | 0.0260         | 18 |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-30 (90/10)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II\*/Teflon-30 (90/10)

X NO.: 381 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 9/2/66

LOT NO.:

INITIAL QUANTITY: 109 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

NOL: WE Division  
(R. Hellar)

DATE OF TEST

| I                  |  | II             |
|--------------------|--|----------------|
| S = 68 cm          |  | 76 cm          |
| s = 0.15 log units |  | 0.12 log units |
| n =                |  |                |

Remarks

\*Made from HNS-IIB Lot 11138  
(24 & 25). Material purchased  
from Chemtronics (formerly  
Northrup Carolina, Inc.) in  
August 1966.

E 5 d 2

4 Sep 1973

HNS-II/TEFLON-30,

EXPLOSIVE (90/10)

X No. 581

Date of Test

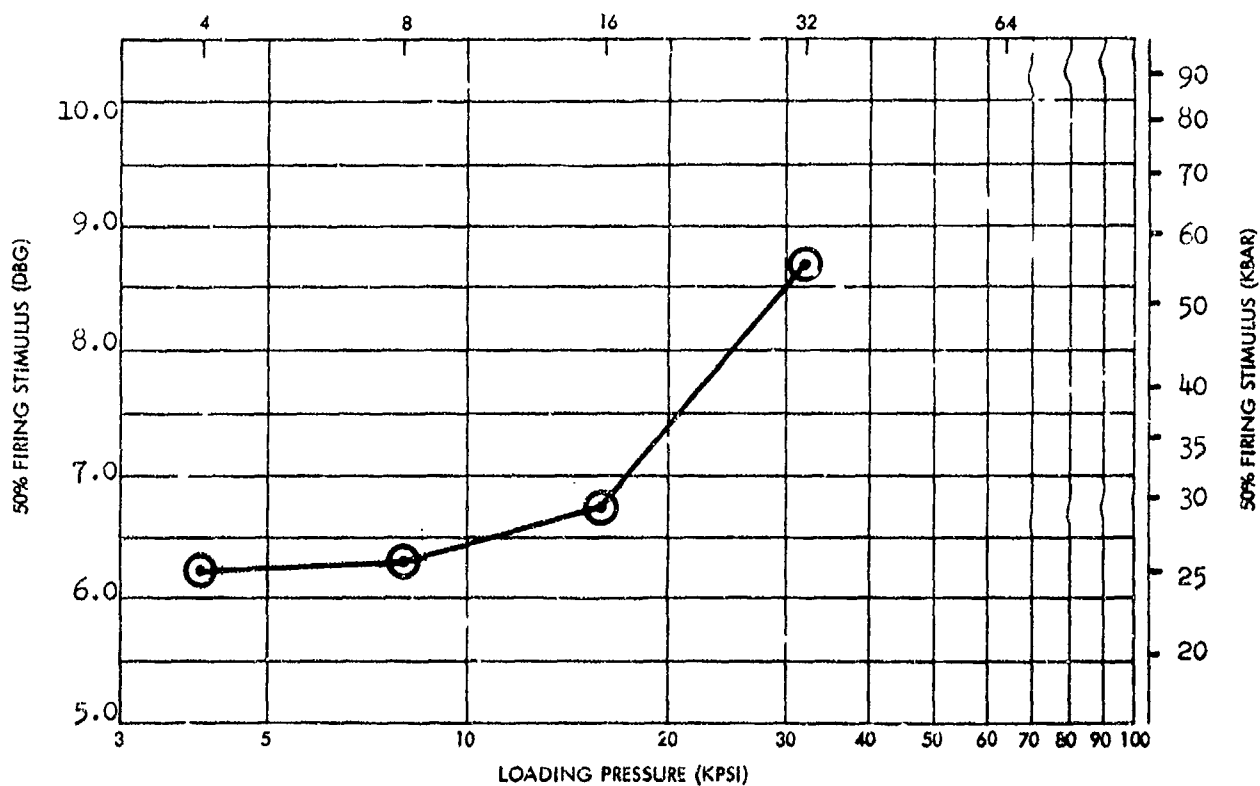
TMD 1.78

I. D. NO. -

1/67

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.422                         | 0.0043 | 79.9  | 6.217             | 0.0962 | 0.0577         | 21 | (1)     |
| 8                       | 1.511                         | 0.0024 | 84.9  | 6.291             | 0.0517 | 0.0340         | 20 | (1)     |
| 16                      | 1.612                         | 0.0039 | 90.6  | 6.747             | 0.4008 | 0.1782         | 24 | (1)     |
| 32                      | 1.627                         | 0.0023 | 95.3  | 8.684             | 0.1714 | 0.0848         | 23 | (1)     |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Tested at -315°F



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-30 (90/10)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II\*/Teflon-30 (90/10)

X NO.: 581      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 9/2/66

LOT NO.:

INITIAL QUANTITY: 109 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)

NOL: WE Division  
(H. Hellar)

DATE OF TEST

| I           |                | II |                |
|-------------|----------------|----|----------------|
| $\bar{x}$ = | 68 cm          |    | 76 cm          |
| s =         | 0.12 log units |    | 0.12 log units |
| n =         |                |    |                |

Remarks

\*Made from HNS-IIB Lot 11138  
(24 & 25). Material purchased  
from Chemtronics (formerly  
Northrup Carolina, Inc.) in  
August 1966.

E 5 e 2

4 Sep 1973



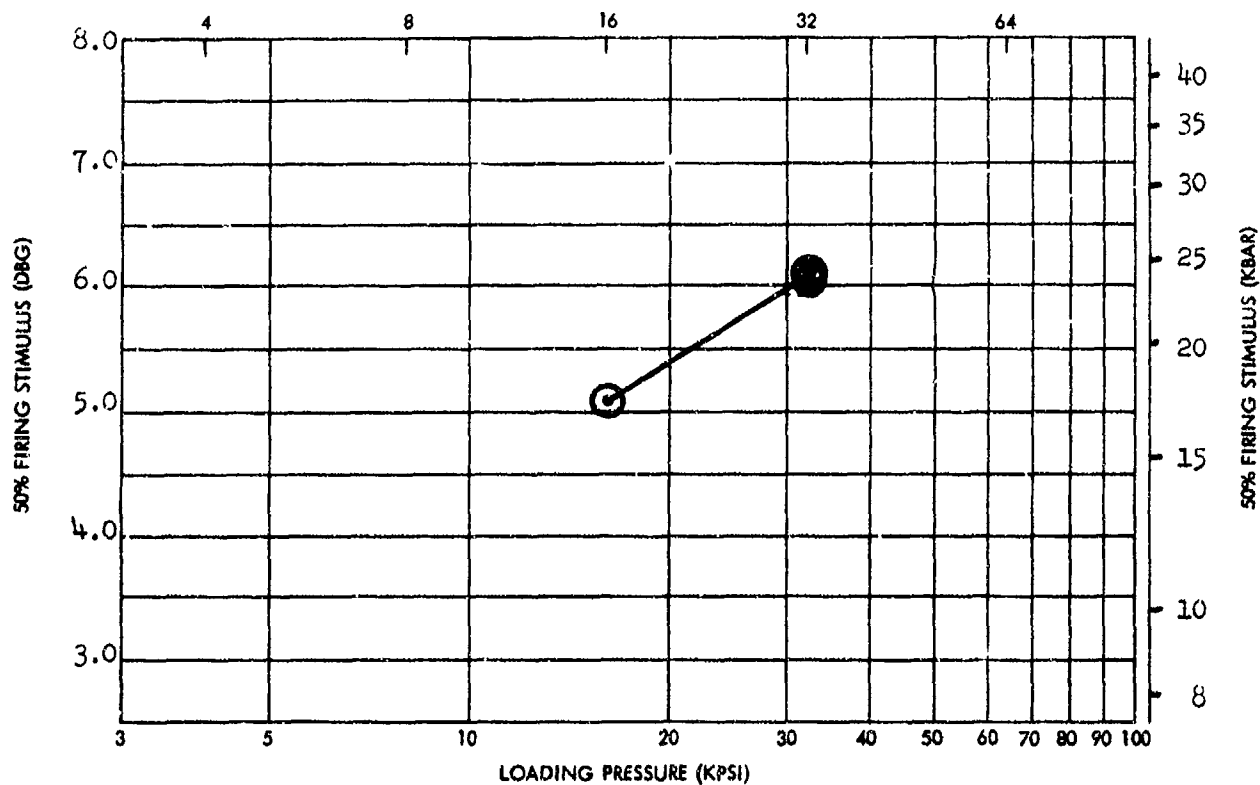
EXPLOSIVE HNS-II/TEFLON-7C,  
(90/10)  
TMD 1.78

X NO. -  
I. D. NO. 1462

Date of Test  
2/71

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 16                            | 1.640                            | 0.0019 | 92.1  | 5.129             | 0.0002 | 0.0003         | 20 |         |
| 32                            | 1.714                            | 0.0023 | 96.3  | 6.051             | 0.0056 | 0.0034         | 20 |         |
| 32                            | 1.715                            | 0.0036 | 96.3  | 6.098             | 0.0018 | 0.0033         | 20 | (1)     |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) Units conditioned at 250°F for 24 hours prior to testing



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-7C (90/10)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II/TEFLON-7C (90/10)

X NO.: ID: 1462 Z NO.: SSGT LOAD ORDER NO.: 1323

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 2/9/71

LOT NO.:

INITIAL QUANTITY: 5 kilograms

BATCH NO.:

MANUFACTURED BY:  
NOL: 233 Division  
Bldg 344  
(W. Elban) \*

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks  
\*Dry Blend 2/8/71

HNS-II/TEFLON-7C.

EXPLOSIVE (90/10)

X NO. 757

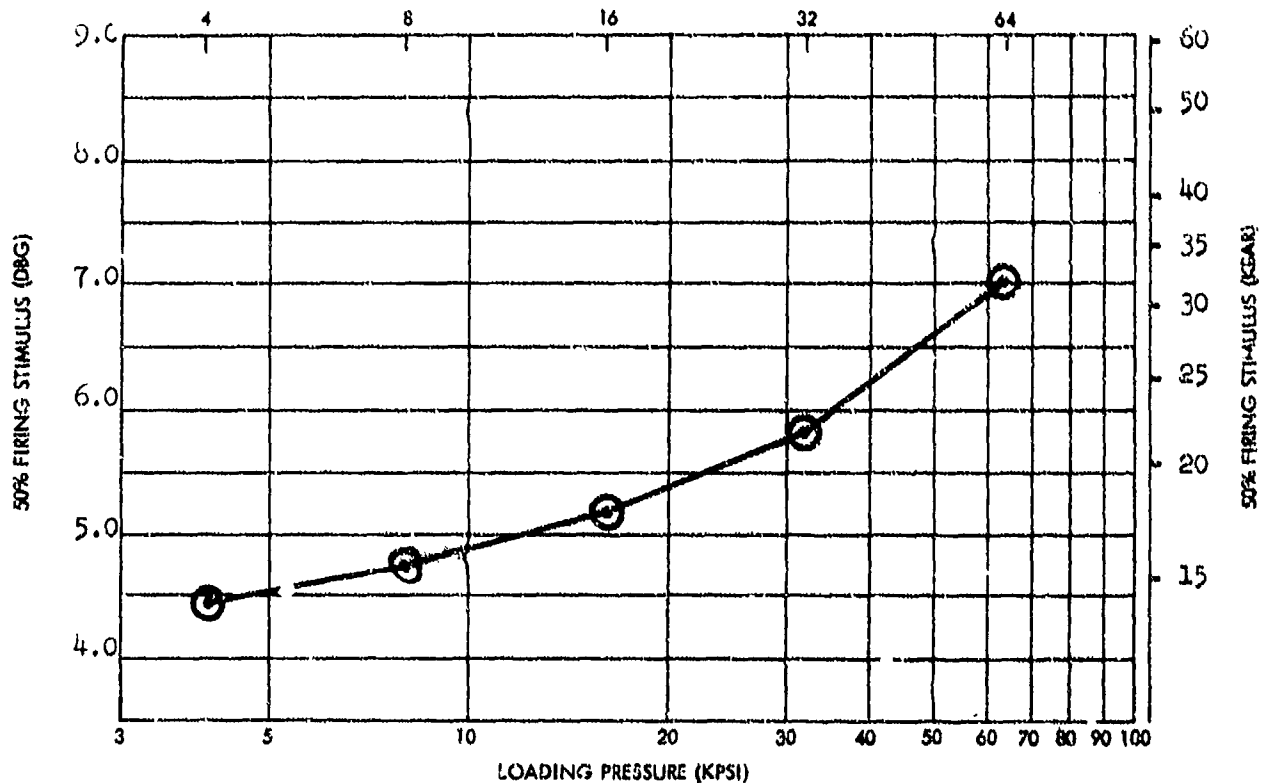
Date of Test  
2/71

TMD 1.78

I. O. NO. 1493

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 4                             | 1.396                            | 0.0062 | 78.4  | 4.495             | -      | -              | 21 | (1)     |
| 8                             | 1.502                            | 0.0047 | 84.4  | 4.746             | 0.0026 | 0.0018         | 22 |         |
| 16                            | 1.625                            | 0.0027 | 91.3  | 5.184             | 0.0030 | 0.0023         | 20 |         |
| 32                            | 1.703                            | 0.0026 | 95.7  | 5.831             | 0.0050 | 0.0033         | 20 |         |
| 32                            | 1.704                            | 0.0045 | 95.7  | 5.891             | 0.0004 | 0.0003         | 20 |         |
| 64                            | 1.752                            | 0.0024 | 98.4  | 7.011             | 0.0040 | 0.0024         | 23 |         |

(1) No mixed response zone


SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-7C, (90/10)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II\*/TEFLON-7C (90/10)\*\*

X NO.: 757 ID: 1493\*\*\*S NO.:

SSGT LOAD ORDER NO.: 1329 &  
1336

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 4/16/71

LOT NO.: CH 1384

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

NOL: 233 Division  
Bldg 615  
(C. Misener)\*\*\*\*

IMPACT SENSITIVITY (E or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

E = cm

S = log units

n =

Remarks

- \* HNS-II - I.D. No. 1478  
Del Mar Lot No. 250-7  
N60921-71-C-0152
- \*\* Teflon duPont 7C  
Lot No. 10001
- \*\*\* Sample taken from 200-pound  
mix X No. 757, I.D. No. 1494
- \*\*\*\* 50-pound batches mixed in  
55-gallon drum -- 4 hours  
@ 11 R.P.M. The four 50-pound  
batches blended together in  
109-gallon drum with baffles  
8 hours @ 9 R.P.M.

E 6 b 2

4 Sep 1973

NOLTR 73-132

HNS-II/TEFLON-7C

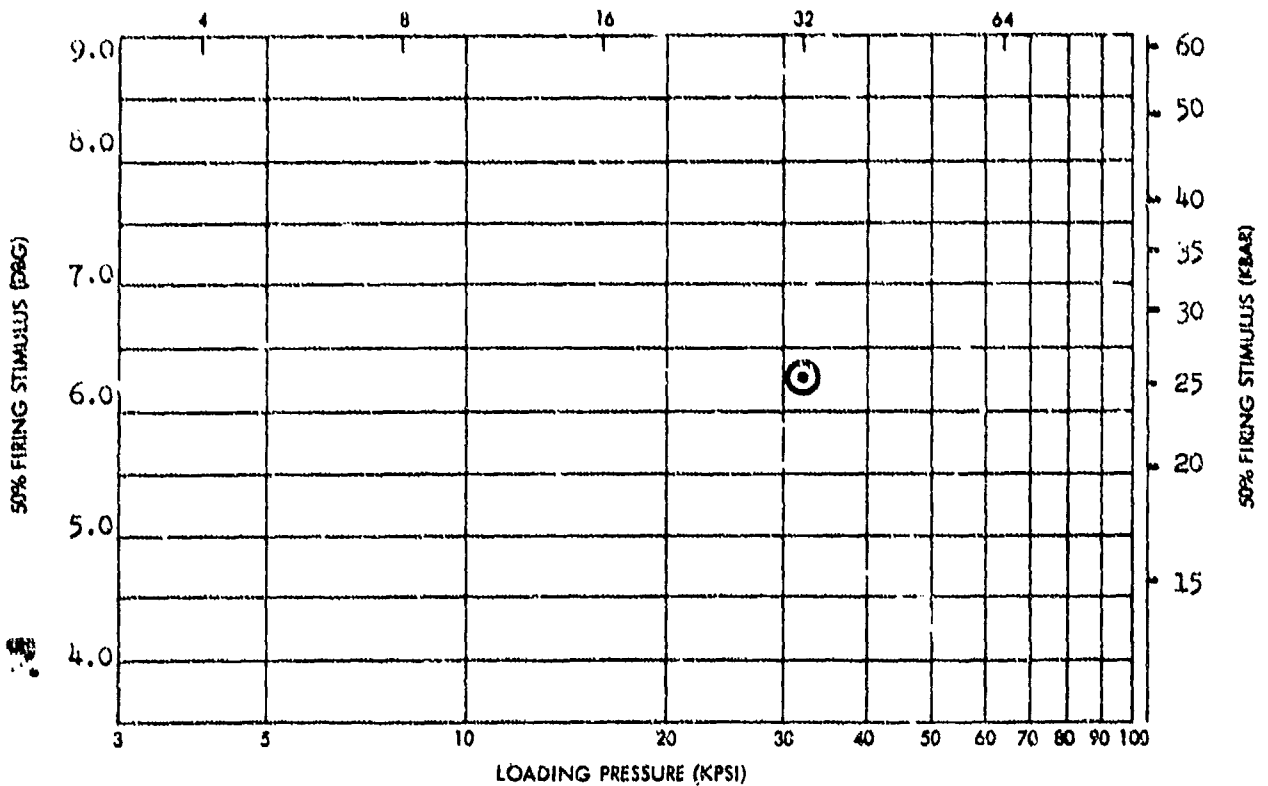
EXPLOSIVE (90/10)  
TMD 1.78

X NO.  
I. O. NO. 1541

Date of Test  
8/71

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DAG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | Q      | s <sub>m</sub> | N  |         |
| 30                            | 1.699                            | 0.0024 | 95.4  | 6.271             | 0.0023 | 0.0052         | 20 | (1)     |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) Reblended from machinings obtained from pressed charges made from HNS-II/TEFLON-7C (90/10) x No. 757



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-7C, (90/10)

E6c1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: HNS-II/TEFLON-7C (90/10)

X NO.: ID: 1541 E NO.: SSGT LOAD ORDER NO.: 1134

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

NOL: 233 Division

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

# = cm

n = log units

n =

Remarks

Reblend of machinings from  
charges that had been pressed  
from XNo. 757. (The charges  
had been isostatically pressed  
@ 30 KPSI to an approximate  
density of 1.68 gm/cc)

NOLTR 73-132

EXPLOSIVE **PBX-3**

X NO. **474**

Date of Test  
**6/71**

TMD **3.764**

I. D. NO. **1507**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 64                            | 1.623                            | 0.0027 | 96.0  | 7.1 <sup>04</sup> | 0.0046 | 0.0023         | 20 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

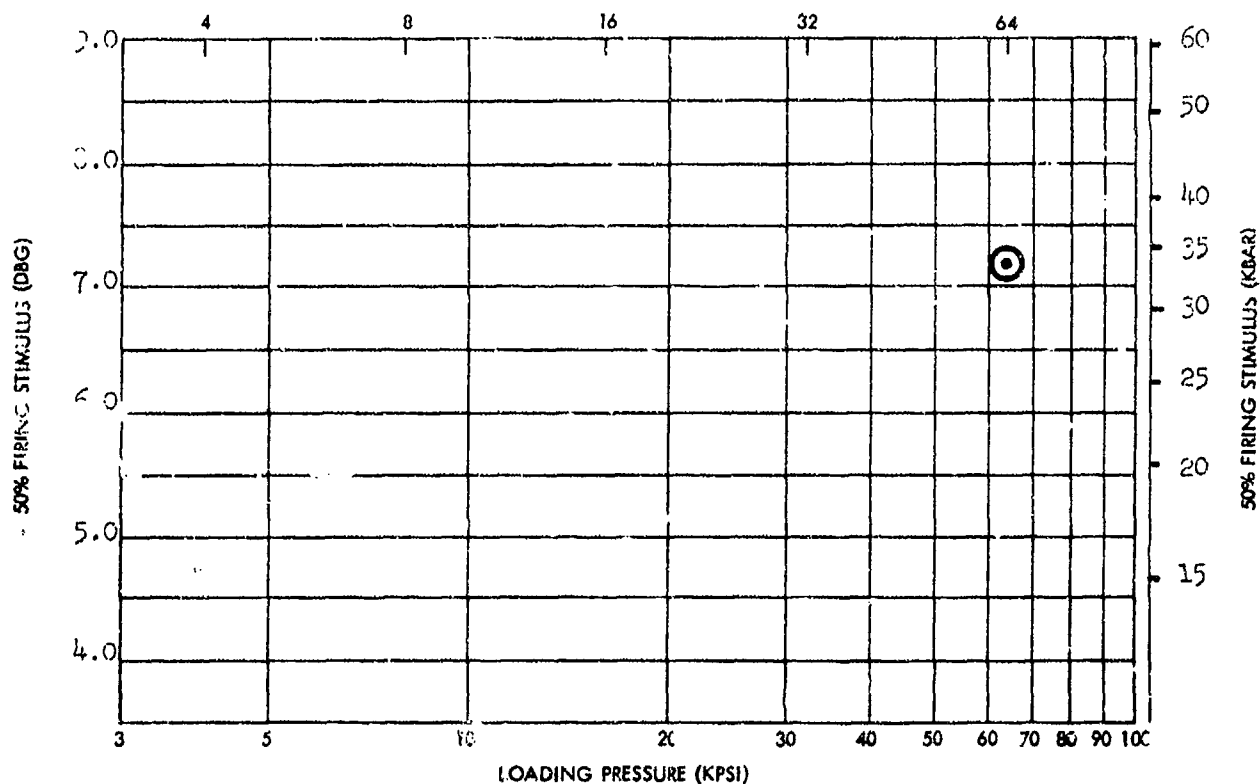


TABLE SMALL SCALE GAP TEST (SSGT) DATA FOR  
**PBX-3**

E7a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PBXN-3\*

X NO.: 474      ID: 1507      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE: NOS Indian Head, Md.

CHEMICAL NAME:

DATE RECEIVED: 5/20/71

LOT NO.: HOL-SR-95A-63

INITIAL QUANTITY: 400 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ =      cm

s =      log units

n =

Remarks

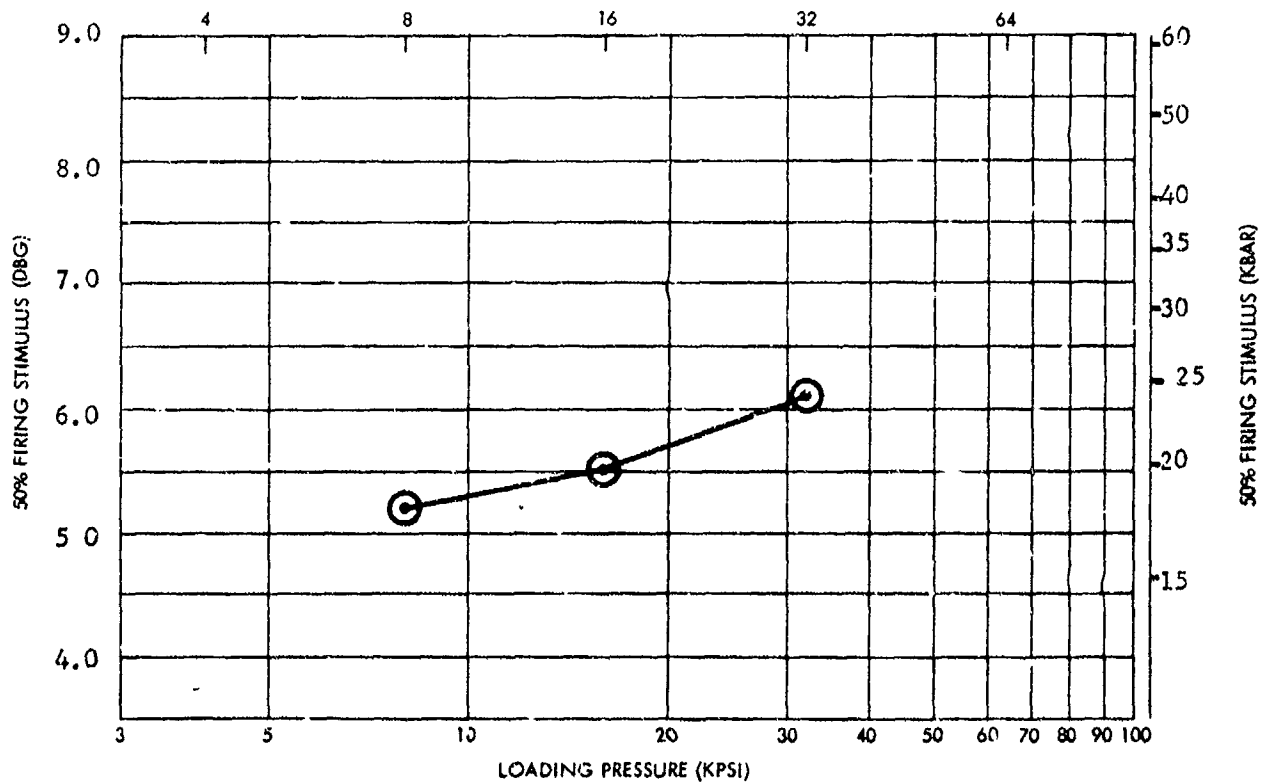
\*Composition: HMX/NYLON (86/14)



|           |            |           |               |              |
|-----------|------------|-----------|---------------|--------------|
| EXPLOSIVE | PBXC-6 (1) | X NO.     | 419           | Date of Test |
| TMD       | -          | I. D. NO. | 437, 438, 441 | 9/67         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.644                         | 0.0046 | -     | 5.192             | 0.0263 | 0.0210         | 20 |         |
| 16                      | 1.719                         | 0.0035 | -     | 5.518             | 0.0132 | 0.0122         | 20 |         |
| 32                      | 1.793                         | 0.0024 | -     | 6.109             | 0.0103 | 0.0098         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Predecessor to PBXN-5.



SMALL SCALE GAP TEST (SSGT) DATA  
PBXC-6 (1)

E8a1

4 Sep 1973

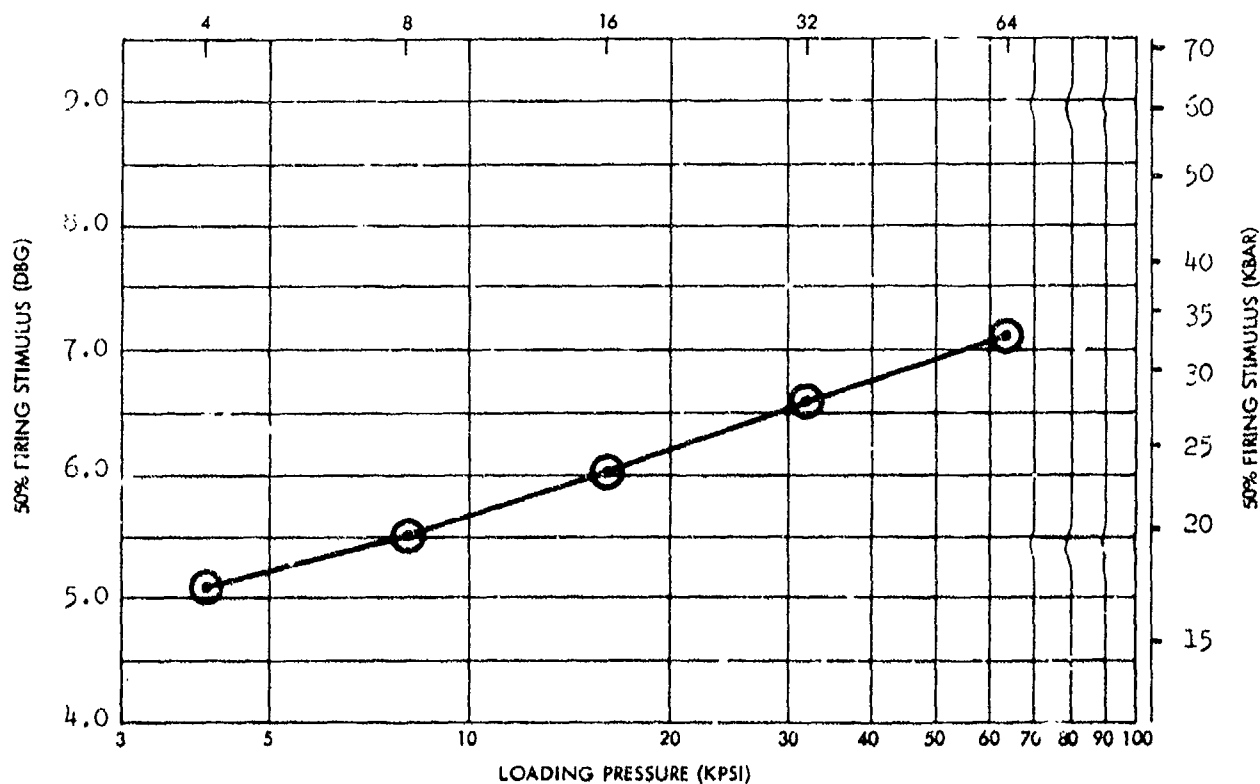
## CHEMICAL DATA

4 Sep 1973

WOLTR 73-132

|           |               |           |     |                       |
|-----------|---------------|-----------|-----|-----------------------|
| EXPLOSIVE | <b>PBXN-5</b> | X NO.     | 618 | Date of Test<br>10/67 |
| TMD       | 1.005         | I. D. NO. | 570 |                       |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.511                         | 0.0079 | 79.3  | 5.124             | 0.0070 | 0.0054         | 20 |         |
| 8                       | 1.502                         | 0.0037 | 83.4  | 5.509             | 0.0296 | 0.0203         | 20 |         |
| 16                      | 1.668                         | 0.0055 | 87.6  | 6.003             | 0.0034 | 0.0030         | 20 |         |
| 32                      | 1.758                         | 0.0030 | 92.3  | 6.611             | 0.0307 | 0.0249         | 20 |         |
| 64                      | 1.846                         | 0.0031 | 96.2  | 7.111             | 0.0175 | 0.0144         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
PBXN-5

E8b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PBXN-5 \*

X NO.: 618 ID: 579 Z NO.: SSGT LOAD ORDER NO.: 1205

SOURCE: NOTS, China Lake B/L-D-1167670

Voucher No. 7283-9250

CHEMICAL NAME: 1

DATE RECEIVED: 10/17/67

LOT NO.: WS 7236-1

INITIAL QUANTITY: 8230 grams

BATCH NO.:

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (1/2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

k = cm

s = log units

n =

Remarks

\*Composition: HMX/VITON A (95/5)

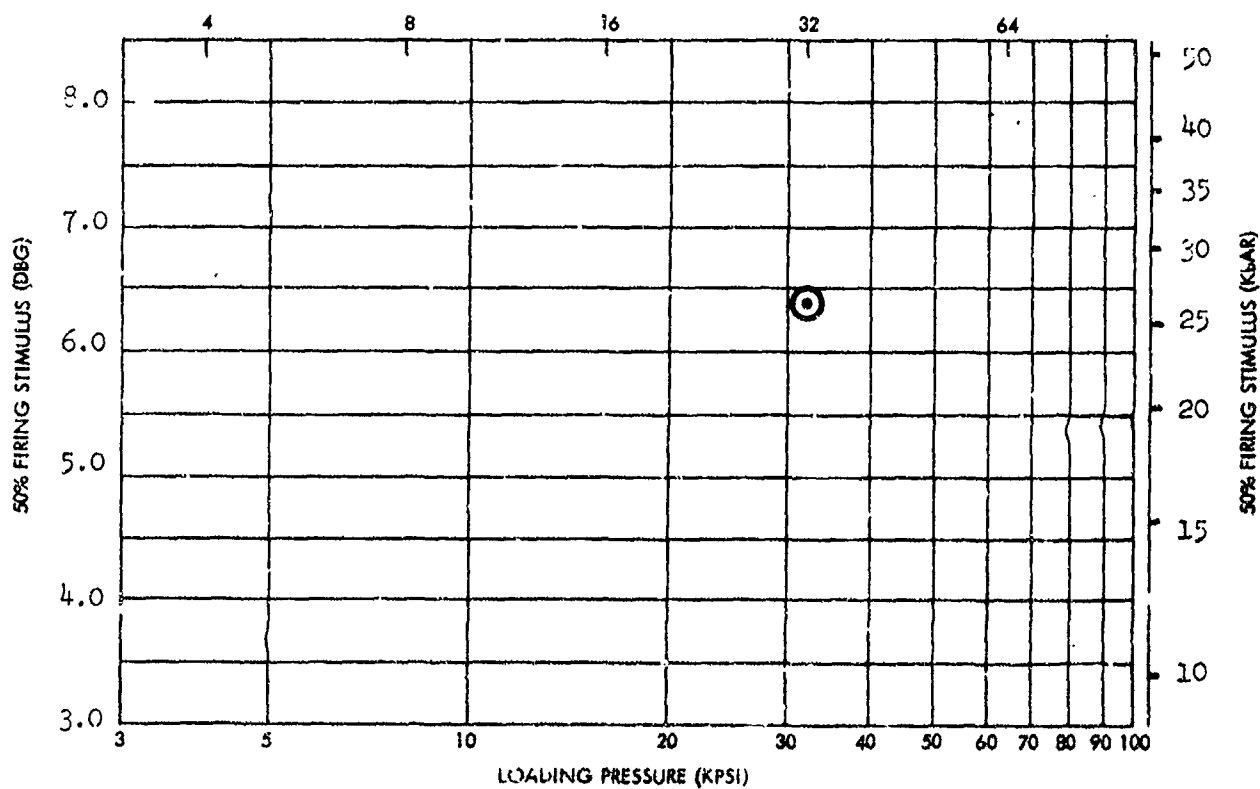
NOLTR 73-132

EXPLOSIVE PBXN-5  
TMD 1.905

X NO. 619  
I. D. NO. 580

Date of Test  
10/67

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 32                      | 1.753                         | 0.0051 | 92.0  | 6.393             | 0.0241 | 0.0247         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
PBXN-5

E8c1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PBXN-5\*

X NO.: 619

ID: 580

Z NO.:

SSGT LOAD ORDER NO.: 1206

SOURCE: NOTS, China Lake B/L-D-116-7670

Voucher No. 7283-9250

CHEMICAL NAME:

DATE RECEIVED: 10/17/67

LOT NO.: WS 7272-1

INITIAL QUANTITY: 1 pound

BATCH NO.:

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

z = cm

s = log units

n =

Remarks

\*Composition: HMX/VITON A (95/5)

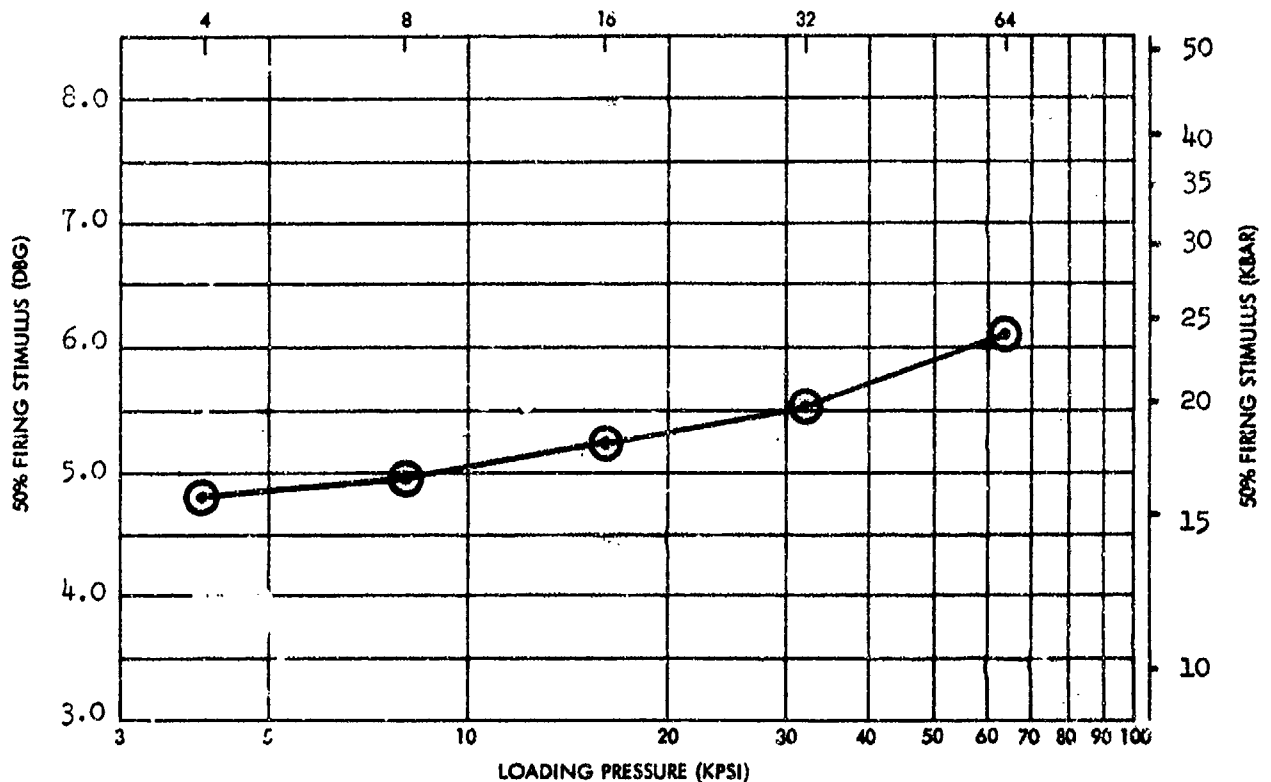
EXPLOSIVE PBXN-5  
TMD 1.905

X NO. 715  
I. D. NO. 1120

Date of Test  
12/69

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (D&G) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.471                         | 0.0058 | 77.2  | 4.818             | -      | -              | 20 | (1)     |
| 8                       | 1.557                         | 0.0054 | 81.7  | 4.986             | 0.0077 | 0.0114         | 20 |         |
| 16                      | 1.658                         | 0.0120 | 87.0  | 5.241             | 0.0188 | 0.0205         | 20 |         |
| 32                      | 1.749                         | 0.0039 | 91.8  | 5.528             | 0.0177 | 0.0270         | 20 |         |
| 64                      | 1.842                         | 0.0041 | 96.7  | 6.127             | 0.0086 | 0.0127         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
PBXN-5

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PBXN-5\*

X NO.: 715 ID: 1120 Z NO.: SSGT LOAD ORDER NO.: 1282

SOURCE: Part of 2000-pound shipment to  
Picatinny Arsenal MIPR N60921-0-8261-0019

CHEMICAL NAME: 2

DATE RECEIVED: 11/26/69 LOT NO.: HOL-951-8

INITIAL QUANTITY: 100 pounds BATCH NO.: 5085-6

MANUFACTURED BY:  
Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

Remarks

\*Composition: HMX/VITON A (95/5)



EXPLOSIVE PBX 9407

X NO.

Date of Test

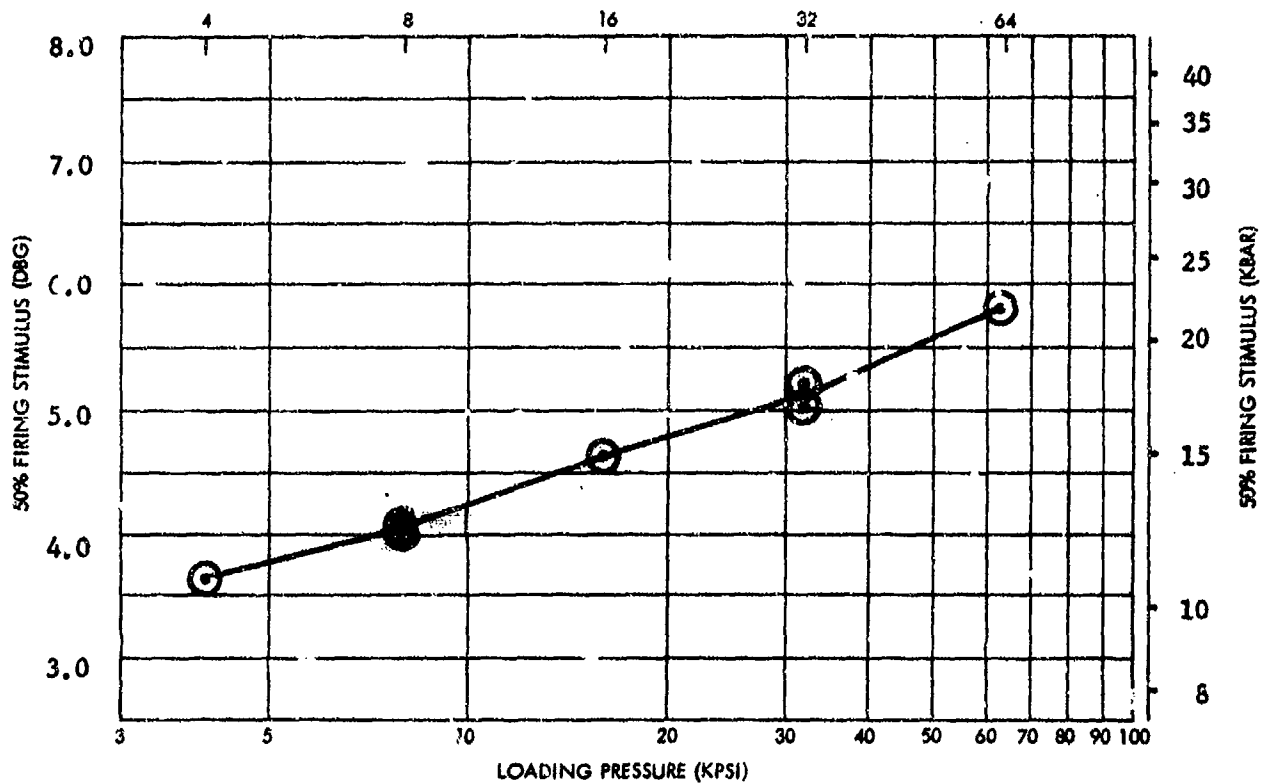
TMD 1.51

I. D. NO. 1467

6/71

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % YMD | SENSITIVITY (DBG) |        |            |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | s      | $\sigma_m$ | N  |         |
| 4                             | 1.269                            | 0.0048 | 70.1  | 3.627             | 0.0185 | 0.0199     | 20 |         |
| 8                             | 1.400                            | 0.0041 | 77.3  | 4.097             | 0.0099 | 0.0135     | 20 |         |
| 8                             | 1.393                            | 0.0056 | 75.9  | 4.007             | 0.0247 | 0.0164     | 20 |         |
| 16                            | 1.508                            | 0.0036 | 83.2  | 4.630             | -      | -          | 20 | (1)     |
| 32                            | 1.653                            | 0.0043 | 91.3  | 5.008             | -      | -          | 20 | (1)     |
| 32                            | 1.666                            | 0.0081 | 92.0  | 5.212             | 0.0218 | 0.0203     | 20 |         |
| 64                            | 1.735                            | 0.0084 | 97.0  | 5.684             | -      | -          | 20 | (1)     |
| 64                            | 1.742                            | 0.0049 | 96.2  | 5.880             | 0.0642 | 0.0367     | 20 |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
PBX 9407

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PBX 9407\*

X NO.: ID: 1467 Z NO.: SSGT LOAD ORDER NO.: 1334 &  
1348

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 2/24/71

LOT NO.: A-142

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

Remarks

\*RDX Class E/Exon (94/6)

Mfd. 26 Jan 71

Dried overnight; 5 Mar 71;

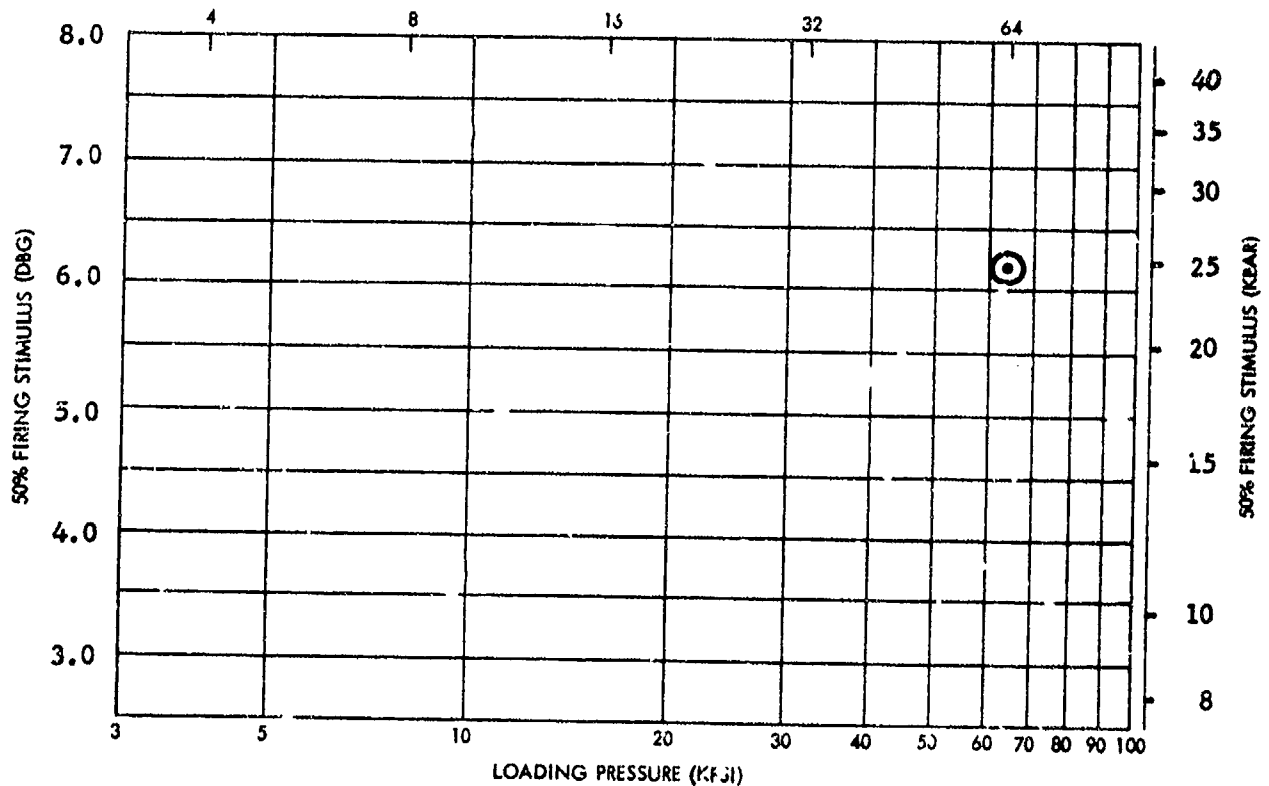
Vacuum @ 50°C

EXPLOSIVE LX-04-0  
TMD 1.89

X NO. -  
I. D. NO. 1305

Date of Test  
6/71

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | s      | s <sub>m</sub> | N  |         |
| 64                            | 1.828                            | 0.0033 | 96.7  | 6.199             | 0.0037 | 0.0025         | 21 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
LX-04-0

E10a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: LX-04-0\*

X NO.: ID: 1505 Z NO.: SSGT LOAD ORDER NO.:

SOURCE: Livermore

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.: 01-SR-583-62

INITIAL QUANTITY: 1/2 pound

BATCH NO.: ELENB #1

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

Remarks

\*Composition: HMX/VITON (85/15)

HNS-II/TEFLON-30  
(95/5)

EXPLOSIVE

X NO.

533

Date of Test

TMD

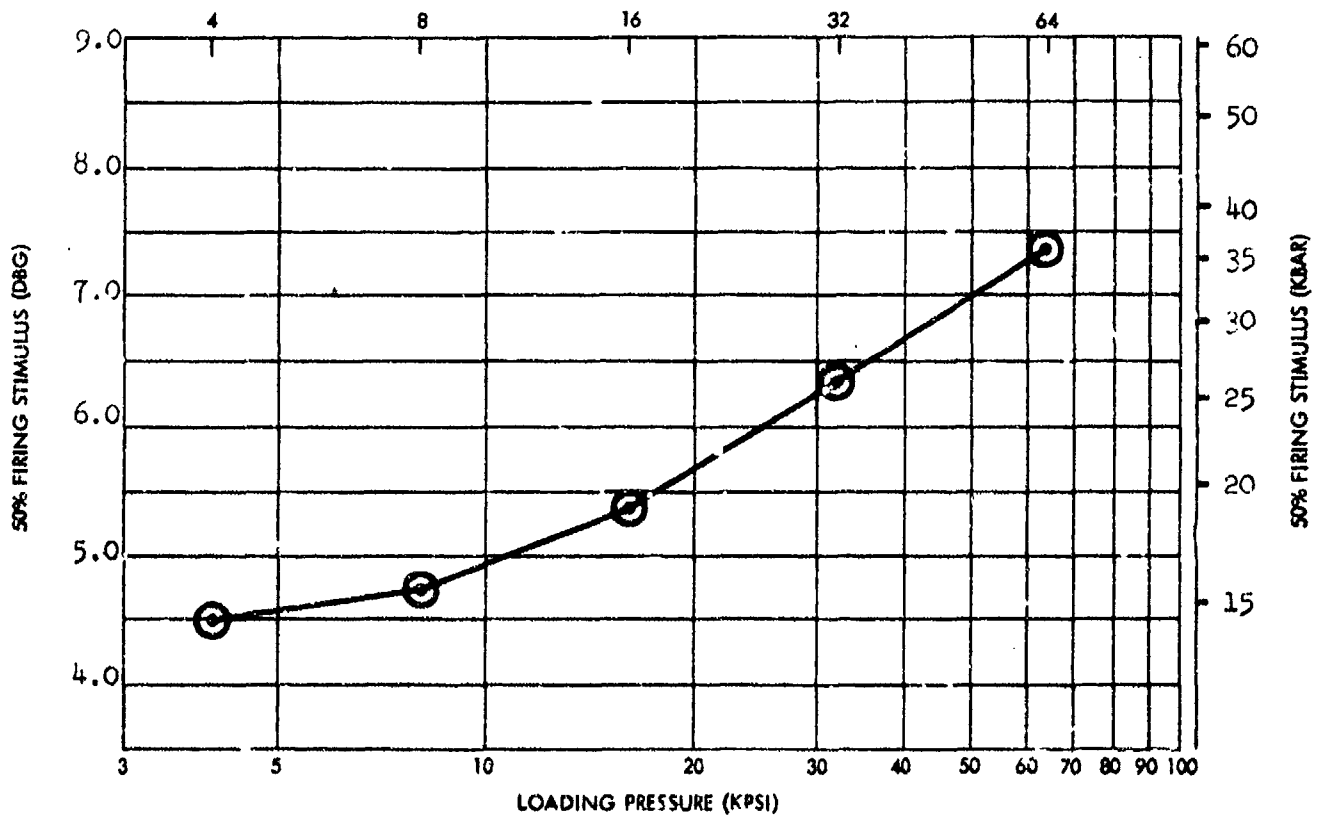
1.76

I. D. NO.

-

7/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.422                            | 0.0052 | 80.8  | 4.495             | 0.0213 | 0.0170         | 18 |         |
| 8                             | 1.524                            | 0.0034 | 86.6  | 4.741             | 0.0162 | 0.0290         | 18 |         |
| 16                            | 1.622                            | 0.0049 | 92.1  | 5.357             | 0.0060 | 0.0268         | 18 |         |
| 32                            | 1.699                            | 0.0027 | 96.5  | 6.354             | 0.0948 | 0.0551         | 18 |         |
| 64                            | 1.745                            | 0.0032 | 99.1  | 7.372             | 0.0024 | 0.0027         | 18 |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
HNS-II/TEFLON-30 (95/5)

E11a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNS-II/TEFLON-30 (25/7)

X NO.: 533 ID: Z NO.: SSGT LOAD ORDER NO.: 1077

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 6/25/65

LOT NO.:

INITIAL QUANTITY: 1/2 pound

BATCH NO.:

MANUFACTURED BY:  
NOL: WE Division

IMPACT SENSITIVITY (# or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST 7/6/65

$\bar{M}$  = 77 cm

$s$  = 0.23 log units

$n$  =

Remarks  
Used HNS-II X528

EXPLOSIVE COMP C-3

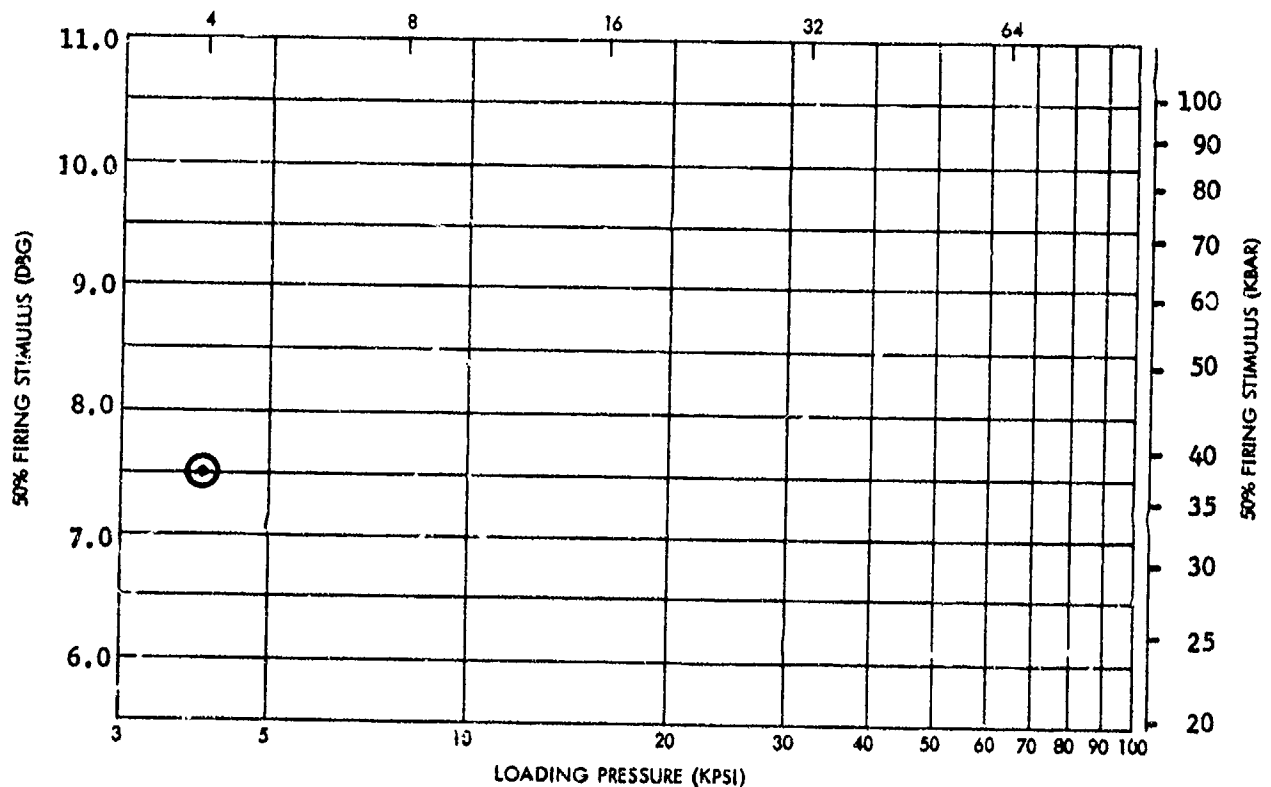
X NO. -

Date of Test  
4/65

TMD -

I. D. NO. -

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (D8G) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.612                            | 0.0296 | -     | 7.510             | 0.1874 | 0.0925         | 23 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

SMALL SCALE GAP TEST (SSGT) DATA  
COMP C-3

Flal

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: COMP C-3\*

X NO.: ID: Z NO.: SSGT LOAD ORDER NO.: 1027

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: LOT NO.:

INITIAL QUANTITY: BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

\*Composition: RDX-----77%  
Tetryl---- 3%  
TNT----- 4%  
DNT-----10%  
MNT----- 5%  
NC----- 1%

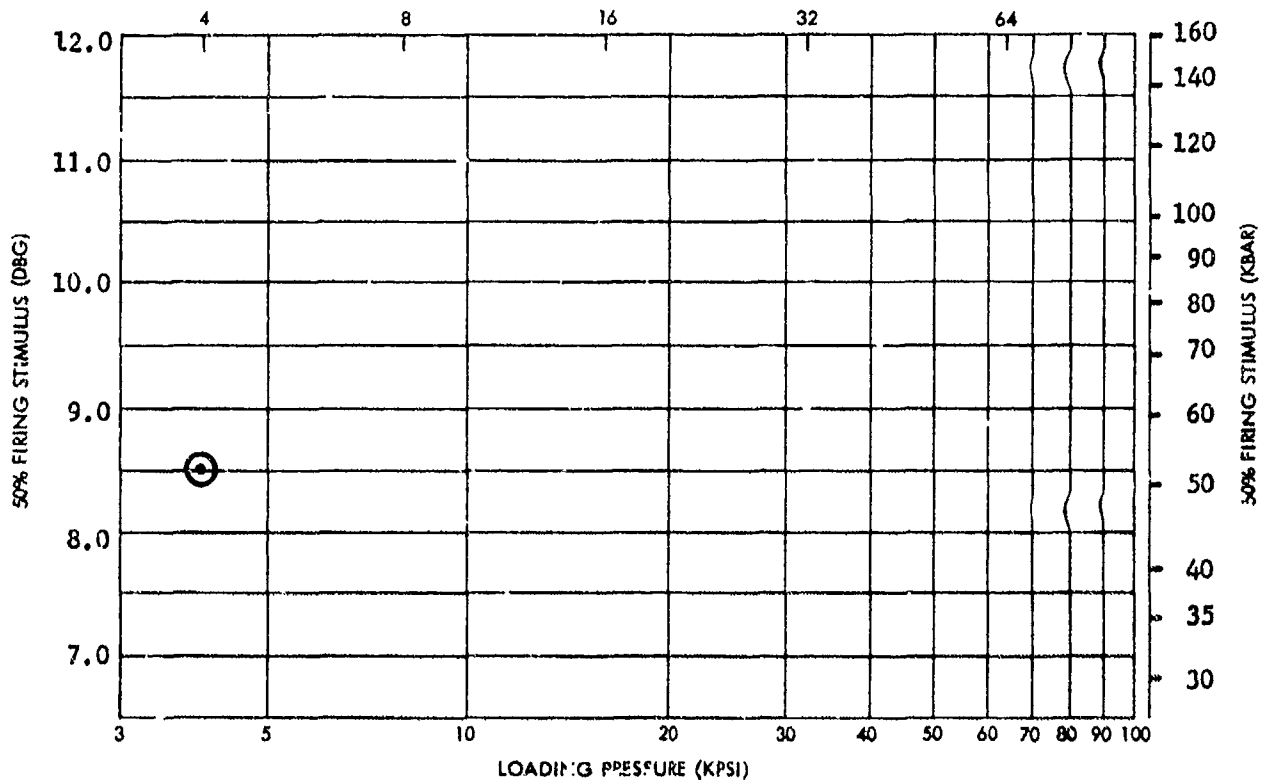


EXPLOSIVE **COMP C-4**  
TMD **-**

X NO. **524**  
I. D. NO. **-**

Date of Test  
**4/65**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.643                            | 0.0044 | -     | 8.508             | 0.0278 | 0.0196         | 23 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
COMP C-4

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: COMP C-4 \*

X NO.: 524

ID:

Z NO.:

SSGT LOAD ORDER NO.: 1028

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

Remarks

\*Composition: RDX/Inert Plasticizer (91/9)

EXPLOSIVE TNETB

X NO. 563

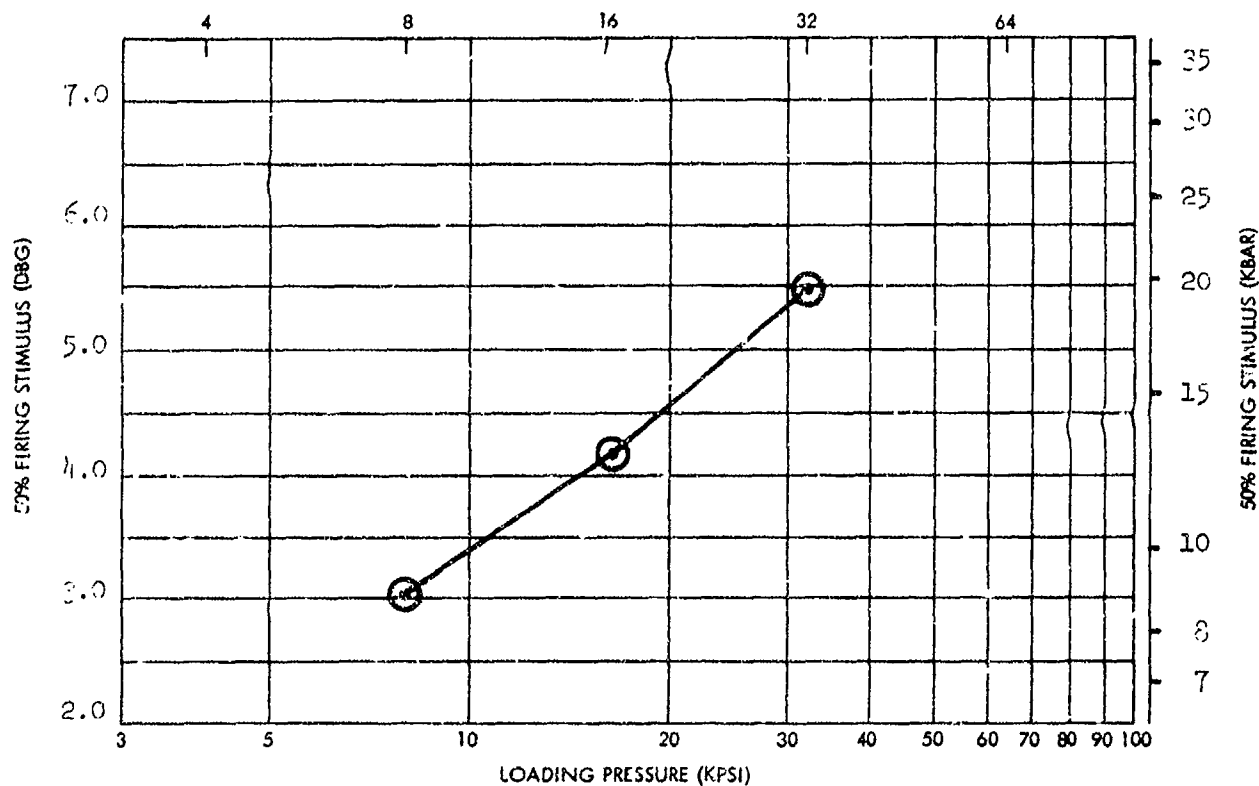
Date of Test  
7/66

TMD 1.72

I. D. NO. -

| LOADING<br>PRESSURE<br>(KFSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 0                             | 1.563                            | 0.0063 | 87.3  | 3.042             | -      | -              | 23 | (1)     |
| 16                            | 1.698                            | 0.0046 | 94.9  | 4.193             | 0.0530 | 0.0306         | 23 |         |
| 32                            | 1.776                            | 0.0023 | 99.2  | 5.497             | 0.0016 | 0.0022         | 23 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) No mixed response zone

SMALL SCALE GAP TEST (SSGT) DATA  
TNETB

F3a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TNETB

X NO.: 563      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE: Yorktown  
BOSO 166218

CHEMICAL NAME: Trinitroethyl-Trinitrobutyrate

DATE RECEIVED: 2/20/56

LOT NO.: 86-107-86

INITIAL QUANTITY:

BATCH NO.: A1 No. 801 889

MANUFACTURED BY:

Naugutuck Chemical  
Naugutuck, Conn.  
NC 84  
PB 94, 99, 93, 93

IMPACT SENSITIVITY (s or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

s = 18 cm

s = log units

n =

Remarks

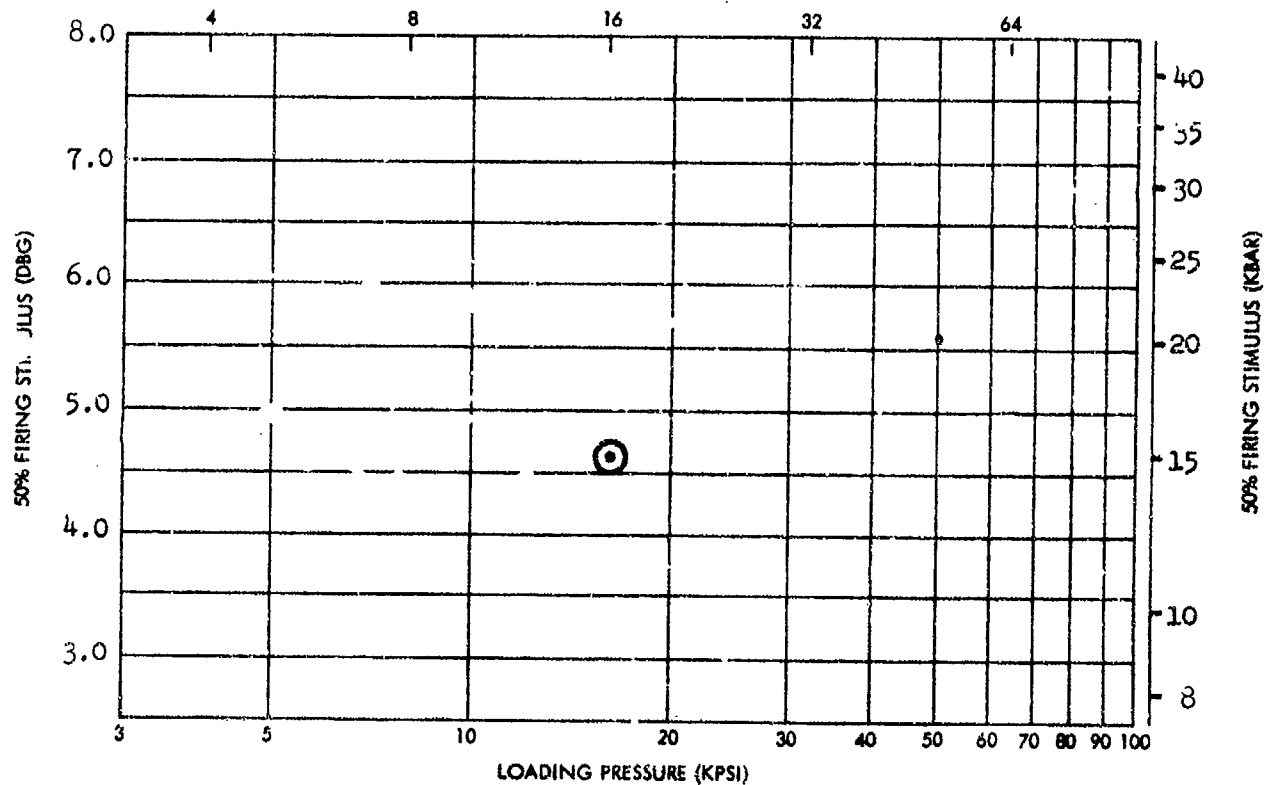
EXPLOSIVE | TNEDV  
TMD | -

X NO. | 579  
I. D. NO. | -

Date of Test  
9/66

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |   |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|---|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g | s <sub>m</sub> | N  |         |
| 8                             | 1.436                            | 0.0032 | -     | 4.622             | - | -              | 23 | (1)     |
|                               |                                  |        |       |                   |   |                |    |         |
|                               |                                  |        |       |                   |   |                |    |         |
|                               |                                  |        |       |                   |   |                |    |         |
|                               |                                  |        |       |                   |   |                |    |         |
|                               |                                  |        |       |                   |   |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
TNEDV

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: TNEDV

X NO.: 579      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME: 2,2,2-Trinitroethyl-4,4-dinitrovalerate

NOL Notebook

DATE RECEIVED: 8/18/66

LOT NO.: 95-7696-pg 8

INITIAL QUANTITY: 500 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WO Division  
Bldg 310  
(Dr. K. Shipp)

IMPACT SENSITIVITY (2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

2 = cm

s = log units

n =

Remarks

EXPLOSIVE **HNB (1)**X NO. **501**

TMD

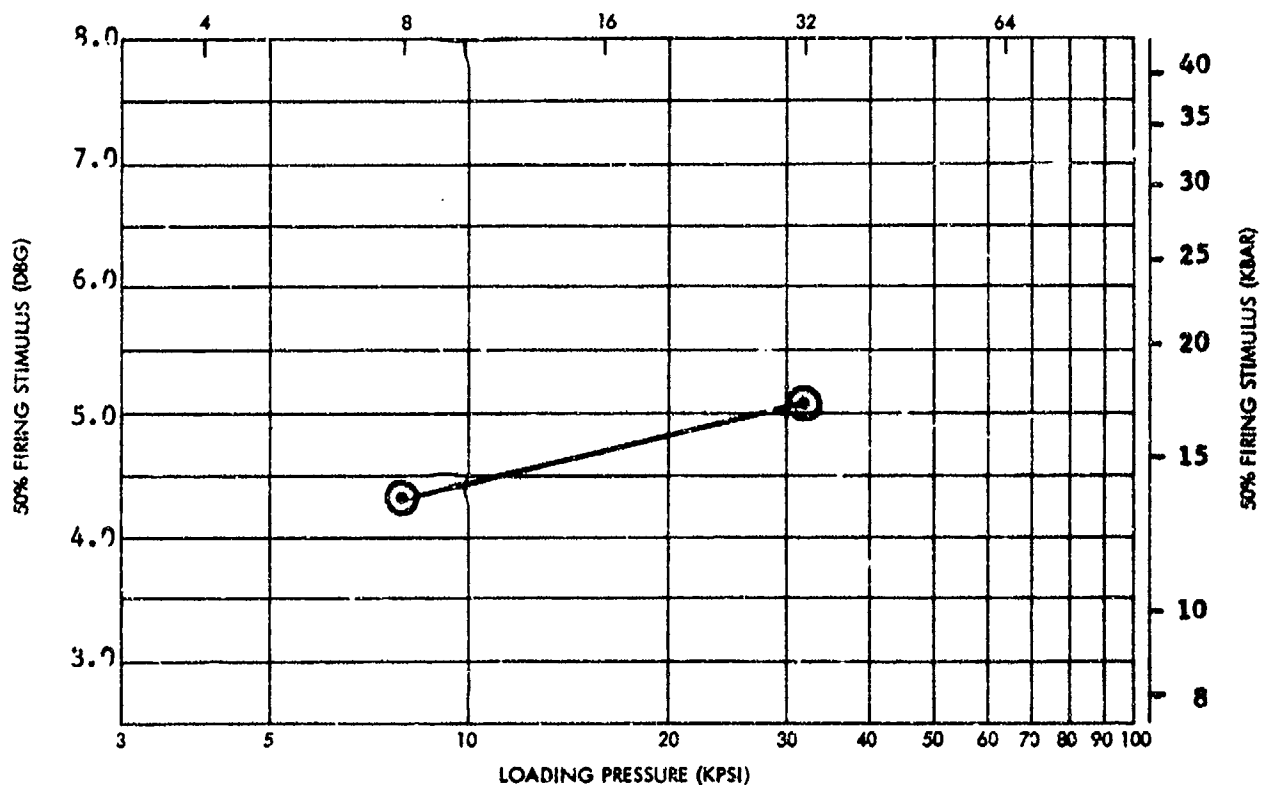
-

I. D. NO.

-

Date of Test  
**9/67**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |               | % TMD    | SENSITIVITY (DBG) |               |                |           | REMARKS    |
|-------------------------------|----------------------------------|---------------|----------|-------------------|---------------|----------------|-----------|------------|
|                               | AVG.                             | s             |          | AVG.              | g             | g <sub>m</sub> | N         |            |
| <b>8</b>                      | <b>1.248</b>                     | <b>0.0143</b> | <b>-</b> | <b>4.332</b>      | <b>0.0470</b> | <b>0.0279</b>  | <b>20</b> |            |
| <b>8</b>                      | <b>-</b>                         | <b>-</b>      | <b>-</b> | <b>4.376</b>      | <b>0.0013</b> | <b>0.0012</b>  | <b>20</b> | <b>(2)</b> |
| <b>32</b>                     | <b>1.570</b>                     | <b>0.0148</b> | <b>-</b> | <b>5.080</b>      | <b>0.0422</b> | <b>0.0276</b>  | <b>20</b> |            |
|                               |                                  |               |          |                   |               |                |           |            |
|                               |                                  |               |          |                   |               |                |           |            |
|                               |                                  |               |          |                   |               |                |           |            |

**(1) Hexanitrobiphenyl****(2) Date of test - 2/65**

SMALL SCALE GAP TEST (SSGT) DATA  
HNB

F5a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: HNB\*

X NO.: 501 ID: Z NO.: 575 SSGT LOAD ORDER NO.: 1010 &  
1188

SOURCE:

CHEMICAL NAME: Hexanitrobiphenyl

DATE RECEIVED: 9/1/64

NOL Notebook  
LOT NO.: 96-7310-pg 24-1

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

NOL: WO Division  
Bldg 310  
(Dr. J. Dacons)

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = 67 cm

s = 0.27 log units

n =

$\bar{x}$  = 85 cm

s = 0.12 log units

$\bar{x}$  = 56 cm

s = 0.12 log units

$\bar{x}$  = 85 cm

s = 0.28 log units

Remarks

\*Recrystallized



EXPLOSIVE EPM-2 (1)  
TMD 1.87

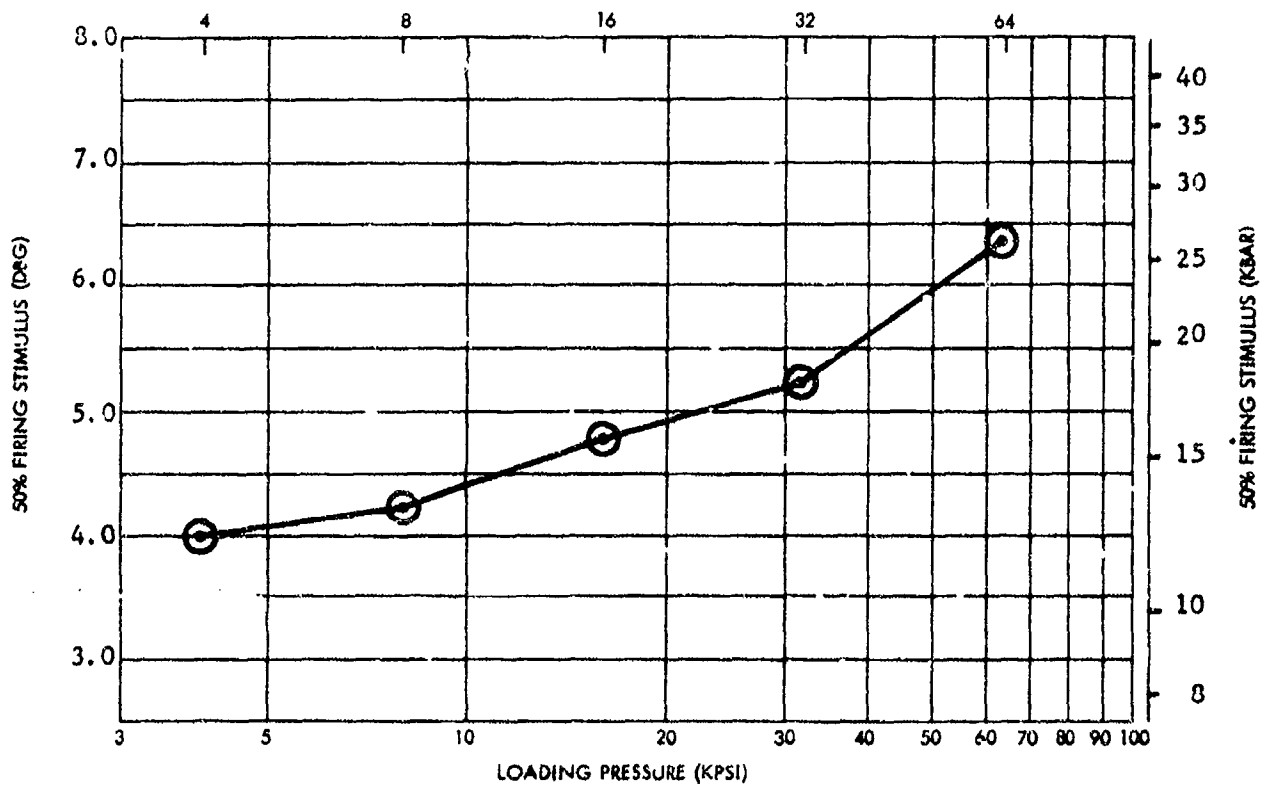
X NO. -I. D. NO. -

Date of Test  
6/61

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                  |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|------------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>111</sub> | N  |         |
| 4                       | 1.550                         | 0.0059 | 82.9  | 4.000             | 0.0155 | 0.0167           | 20 |         |
| 8                       | 1.634                         | 0.0061 | 87.4  | 4.257             | 0.0787 | 0.0496           | 18 |         |
| 16                      | 1.724                         | 0.0038 | 92.2  | 4.732             | -      | -                | 18 | (2)     |
| 32                      | 1.798                         | 0.0016 | 96.2  | 5.243             | 0.0040 | 0.0054           | 17 |         |
| 64                      | 1.846                         | 0.0030 | 98.7  | 6.364             | -      | -                | 18 | (2)     |

(1) EPM-2 is an EPM analogue of CH-6

(2) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
EPM-2 (1)

NOL 73-132

CHEMICAL DATA

EXPLOSIVE NAME: EPM-2 (1)

X NO.: ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (1 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

1 = cm

s = log units

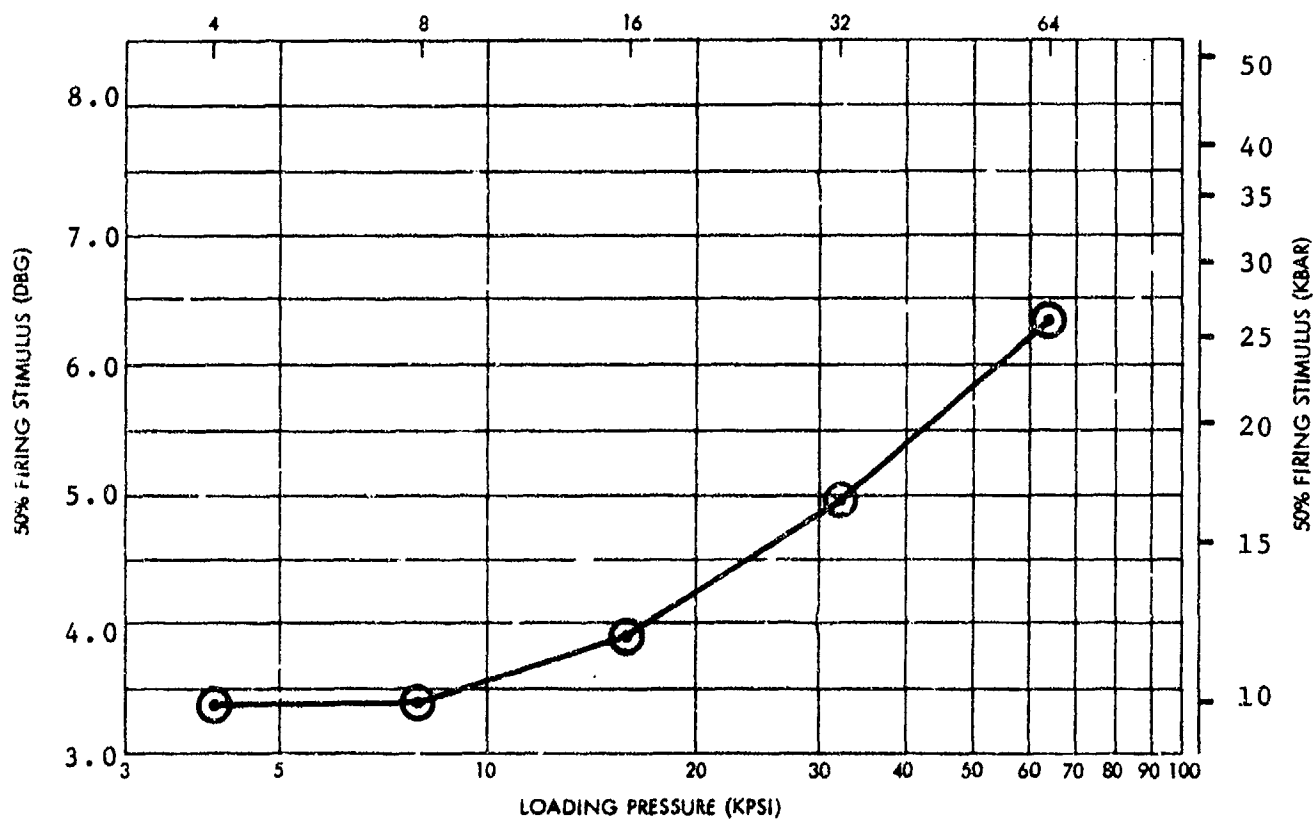
n =

Remarks

(1) EPM-2 is an HMX analogue of CH-6

|           |                      |           |     |              |
|-----------|----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (99.4/0.6) | X NO.     | 348 | Date of Test |
| TMD       | 1.802                | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.439                         | 0.0070 | 79.9  | 3.374             | 0.0774 | 0.0450         | 20 |         |
| 8                       | 1.513                         | 0.0062 | 84.0  | 3.399             | 0.0315 | 0.0222         | 20 |         |
| 16                      | 1.611                         | 0.0059 | 89.4  | 3.901             | 0.0472 | 0.0293         | 20 |         |
| 32                      | 1.699                         | 0.0050 | 94.3  | 4.941             | 0.0913 | 0.0615         | 20 |         |
| 64                      | 1.763                         | 0.0084 | 97.8  | 6.340             | 0.0943 | 0.0520         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (99.4/0.6)

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (99.4/0.6)

X NO.: 348 ID: Z NO.: SSGT LOAD ORDER NO.: 790

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/30/61

LOT NO.: HOL-SR-114-60

INITIAL QUANTITY: 1 pound\*

BATCH NO.: 86-369-1

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (% or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

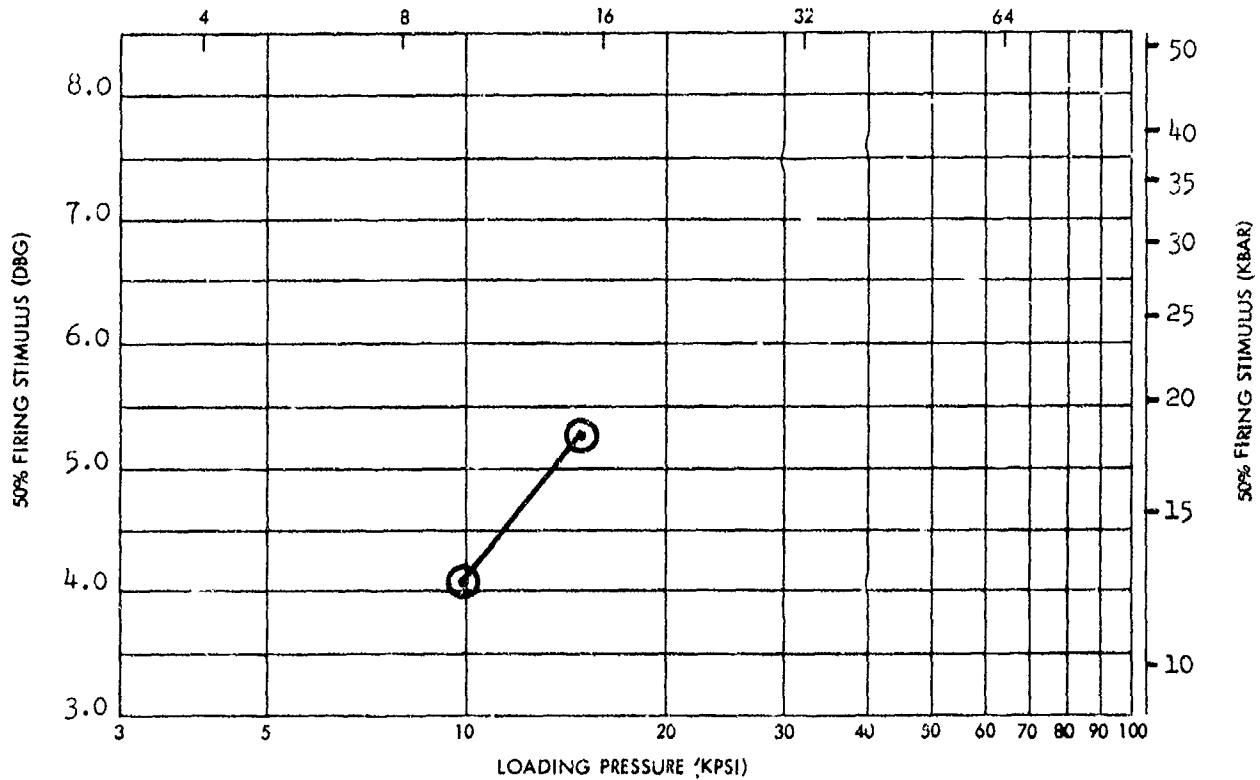
n =

Remarks

\*Approximately 100 pounds,  
manufactured for NOL Corona.  
NOL-WO received 1 pound for  
calibration. Specified  
Calcium Stearate content  
was 0.7% analysis for %  
Calcium Stearate was  
0.59  $\pm$  0.05.

EXPLOSIVE RDX/CA-ST. (99.3/0.7) X NO. 302 Date of Test 4/60  
TMD - I. D. NO. -

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10                      | 1.588                         | 0.0055 | -     | 4.066             | 0.0211 | 0.0123         | 46 |         |
| 15                      | 1.708                         | 0.0051 | -     | 5.316             | 0.0387 | 0.0163         | 46 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST, (99.3/0.7)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (99.3/0.7)

X NO.: 302      ID:      Z NO.: 280      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:      LOT NO.:

INITIAL QUANTITY: 10 pounds      BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Blug 318  
(Reynolds)

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

s =      cm

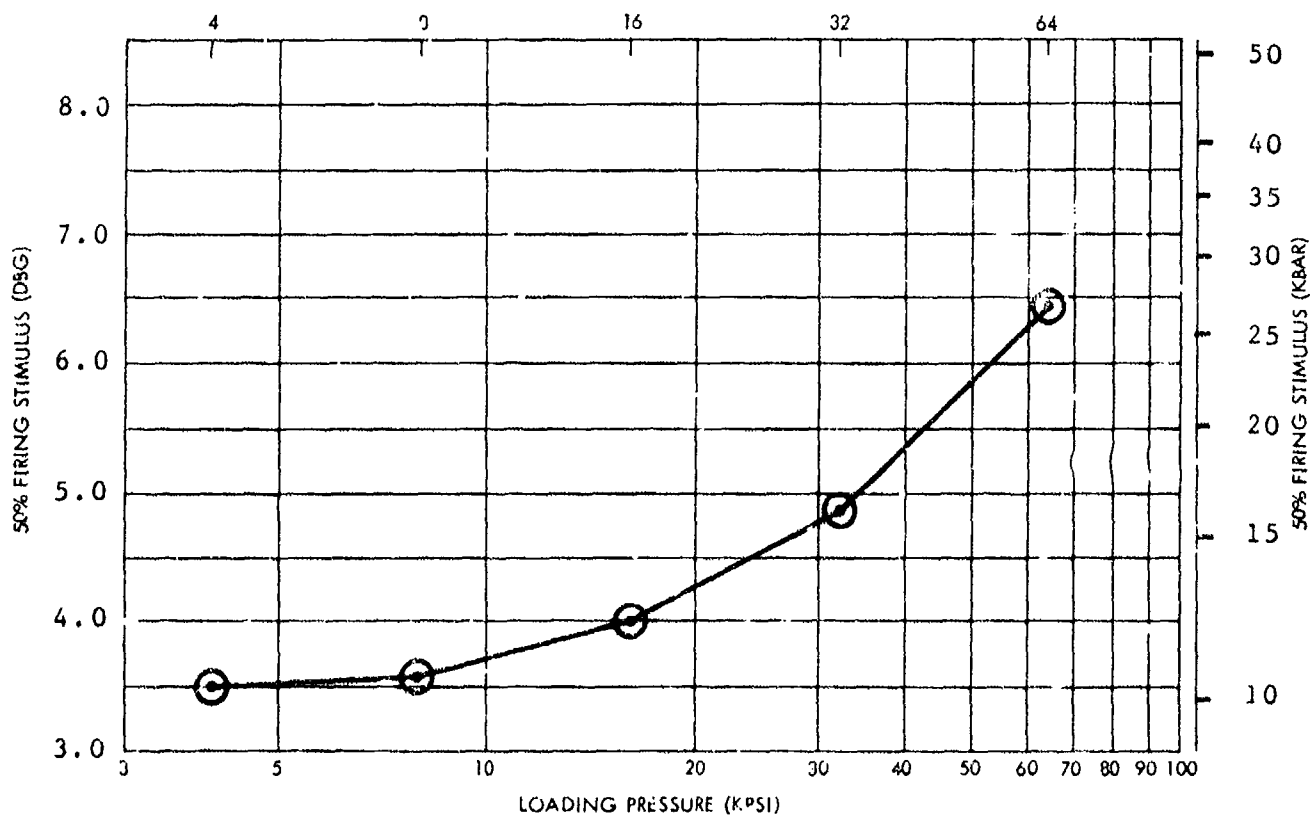
s =      log units

n =

Remarks

|           |                            |           |     |              |
|-----------|----------------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (99.2/0.8) X NC. |           | 349 | Date of Test |
| TMD       | 1.799                      | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.442                         | 0.0022 | 80.3  | 3.501             | 0.0299 | 0.0232         | 20 |         |
| 8                       | 1.513                         | 0.0041 | 84.1  | 3.576             | 0.0328 | 0.0245         | 20 |         |
| 16                      | 1.598                         | 0.0026 | 88.8  | 3.995             | 0.0325 | 0.0234         | 20 |         |
| 32                      | 1.701                         | 0.0050 | 94.5  | 4.844             | 0.0305 | 0.0222         | 20 |         |
| 64                      | 1.767                         | 0.0054 | 98.2  | 6.424             | 0.0637 | 0.0384         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (99.2/0.8)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE: RDX/Calcium Stearate (99.2/0.8)

I NO.: 349 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/30/61

LOT NO.: HCL-SR-115-60

INITIAL QUANTITY: \*

BATCH NO.: 86-369-2

MANUFACTURED BY:

Houston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (% or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

X = cm

S = log units

H =

Remarks:

\*Approximately 100 pounds,  
manufactured for NOL Corona.  
NOL-wt received 1 pound for  
calibration. Analysis for  
RDX/Calcium Stearate was  $0.85 \pm 0.15$

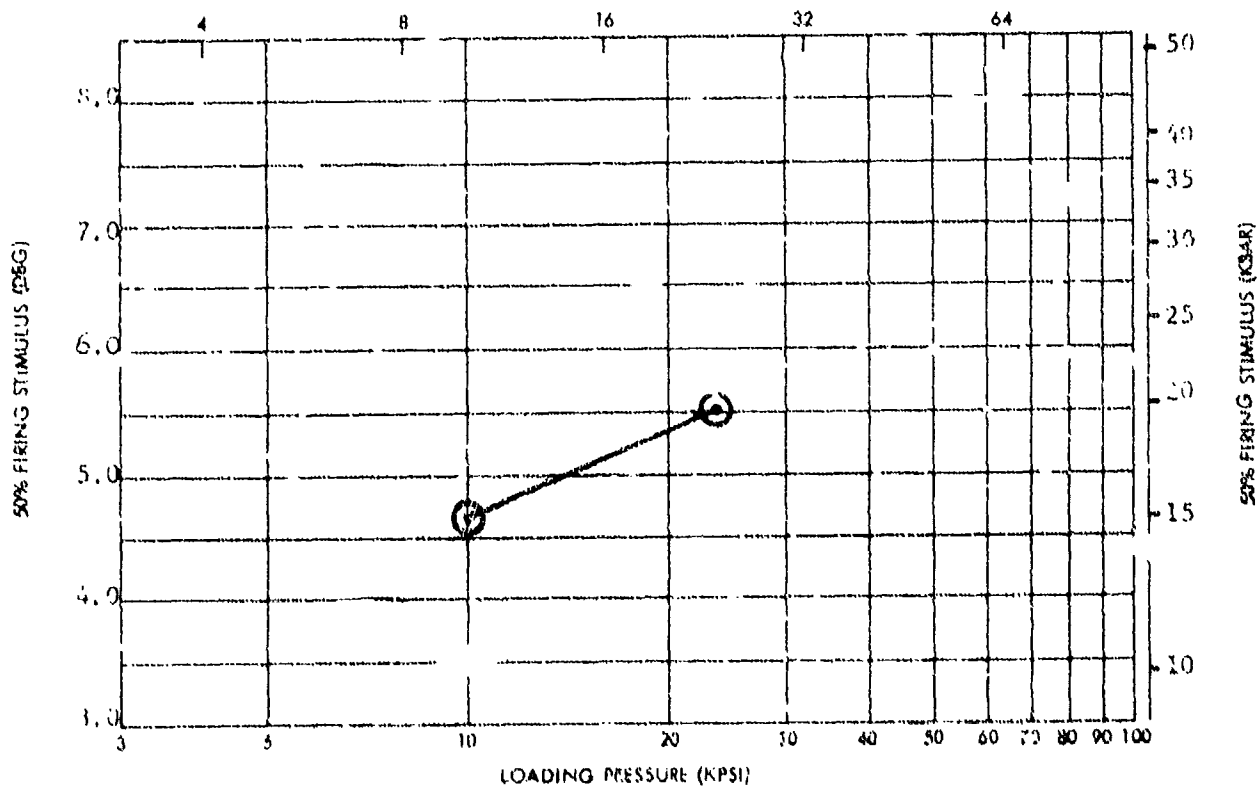
4 Sep 1973



EXPLOSIVE RDX/CA-ST. (98.6/1.4) X NO. 208 Date of Test 12/59  
 TMD - I. D. NO. -

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DEG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10                      | 1.590                         | 0.0039 | -     | 4.641             | 0.0095 | 0.0084         | 46 |         |
| 24                      | 1.703                         | 0.0098 | -     | 5.520             | 0.0109 | 0.0137         | 46 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of Test - 4/60



SMALL SCALE GAP TEST (SSGT) DATA

RDX/CA-ST (98.6/1.4)

G141

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (98.6/1.4)

X NO.: 208      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 9/7/55

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: WE Division  
Bldg 318  
(Canter, Reynolds)

$\bar{S}$  = cm

S = log units

n =

Remarks

(1) RDX X NO. 189 "Chemical Precipitation Method. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

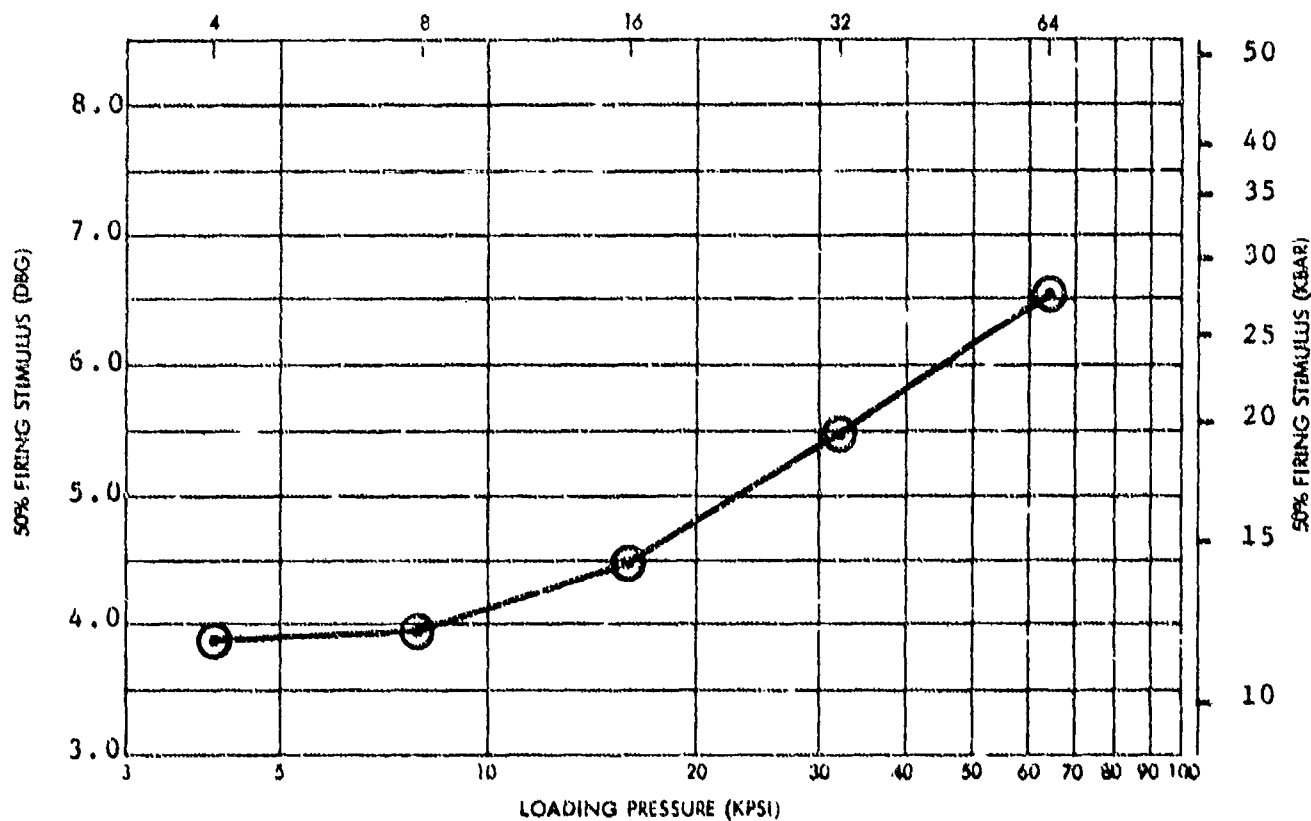
\*Probably it should be Bldg 318, not Bldg 312.

G 1 d 2

4 Sep 1973

|           |                      |           |     |              |
|-----------|----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (98.3/1.7) | X NO.     | 350 | Date of Test |
| TMD       | 1.788                | I. D. NO. | --  | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 4                       | 1.450                         | 0.0089 | 81.1  | 3.882             | 0.0232 | 0.0174         | 20 |         |
| 8                       | 1.531                         | 0.0099 | 85.7  | 3.950             | 0.1010 | 0.0562         | 20 |         |
| 16                      | 1.621                         | 0.0093 | 90.7  | 4.475             | 0.1038 | 0.0583         | 20 |         |
| 32                      | 1.708                         | 0.0053 | 95.5  | 5.473             | 0.0279 | 0.0219         | 20 |         |
| 64                      | 1.760                         | 0.0039 | 98.4  | 6.526             | 0.0576 | 0.0384         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (98.3/1.7)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (98.3/1.7)

X NO.: 350 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/30/61.

LOT NO.:

INITIAL QUANTITY: \*

BATCH NO.: 86-369-3

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (\$ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

\$ = CM

s = log units

n =

Remarks

\*Approximately 100 pounds,  
manufactured for NOL Corona.  
NOL-WO received 1 pound for  
calibration. Specified  
Calcium Stearate content  
was 2.0%. Analysis for %  
Calcium Stearate was  
1.65  $\pm$  0.06.

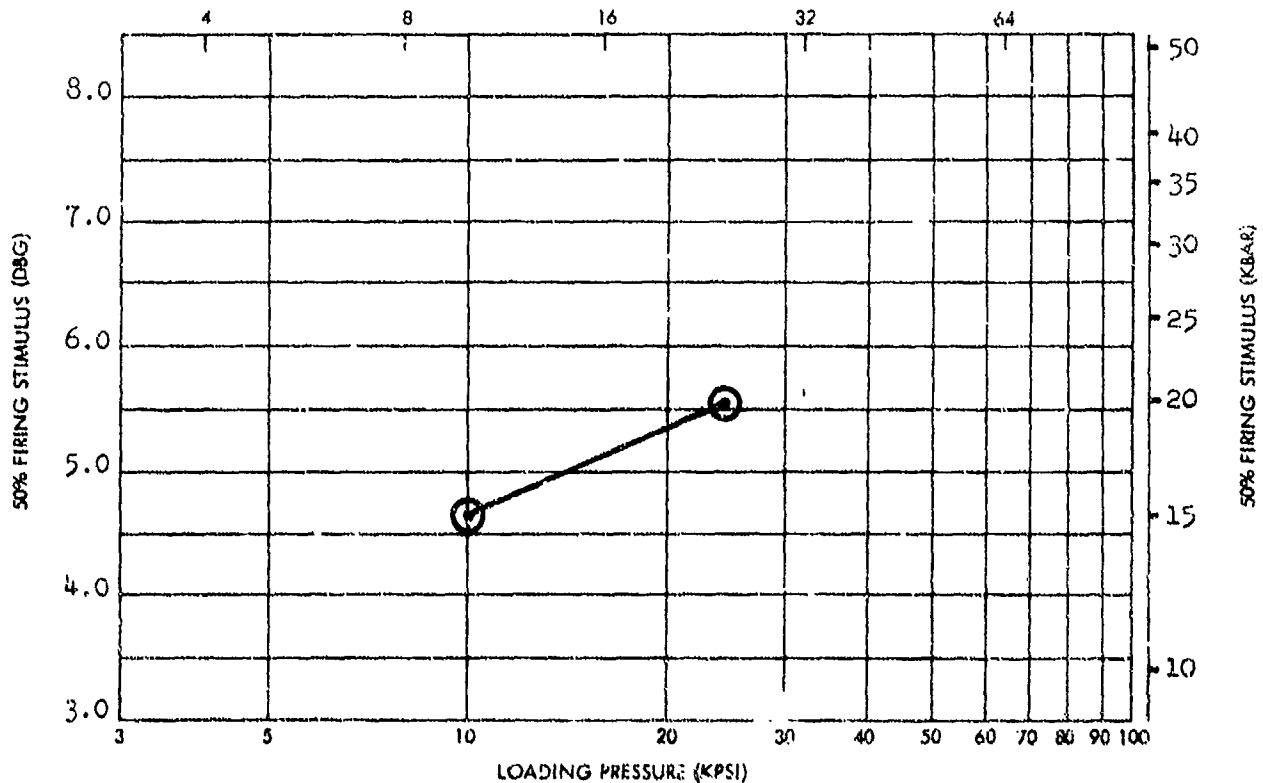
EXPLOSIVE RDX/BA-ST. (98/2)  
TMD -

X NO. 215  
I. D. NO. -

Date of Test  
**12/59**

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10.                     | 1.596                         | 0.0028 | -     | 4.659             | 0.0424 | 0.0175         | 46 |         |
| 24.25                   | 1.702                         | 0.0047 | -     | 5.560             | 0.2229 | 0.0717         | 45 | (1)     |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of Test - 5/60



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/BA-ST. (98/2)

CHEMICAL DATA

EXPLOSIVE NAME: RDx/Calcium Stearate (98.0/2.0)

X NO.: 215      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

E =      cm

S =      log units

n =

Remarks

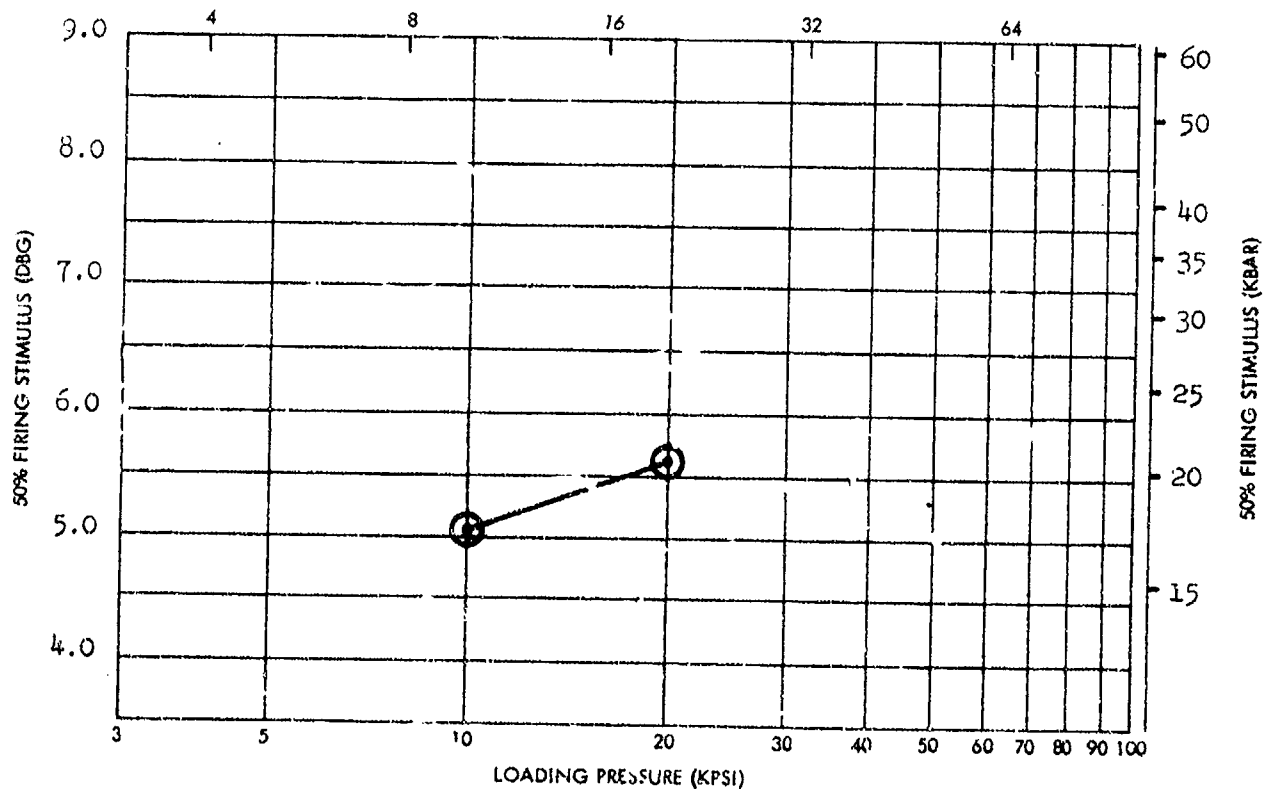
EXPLOSIVE RDX/CA-ST, (98/2)  
TMD -

X NO. 281  
I. D. NO. -

Date of Test  
12/59

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10                      | 1.603                         | 0.0031 | -     | 5.030             | 0.0661 | 0.0237         | 46 |         |
| 20                      | 1.688                         | 0.0045 | -     | 5.629             | 0.1327 | 0.0588         | 46 | (1)     |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of Test - 5/60



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST, (98/2)

Glg1

4 Sep 1973

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (98.0/2.0)

X NO.: 281 ID: Z NO.: 283 SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 8/26/58

LOT NO.:

INITIAL QUANTITY: 4 pounds

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 318

IMPACT SENSITIVITY (\$ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

(1) RDX X NO. 189 "Chemical Precipitation Method. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

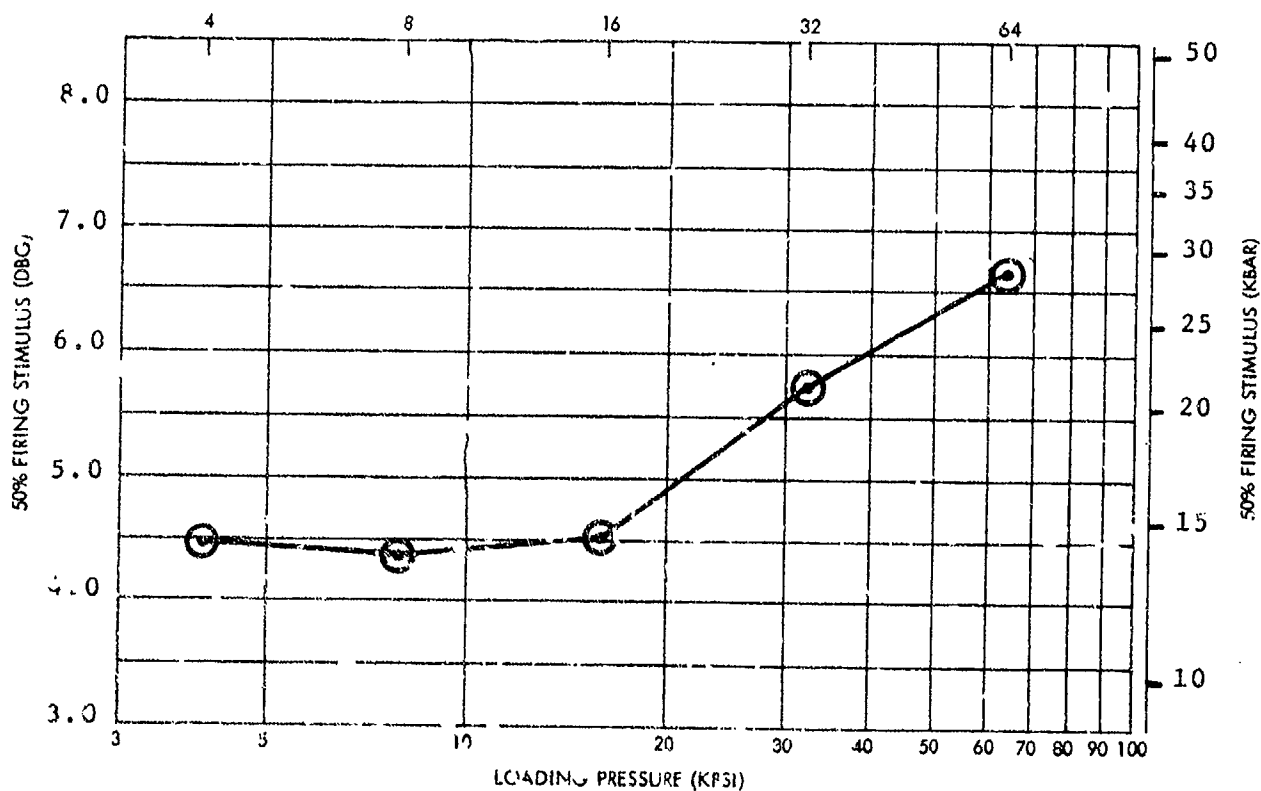
\*Probably it should be Bldg 318, not Bldg 312.



EXPLOSIVE | RDX/CA-ST (97.5/2.5) | X NO. | 353 | Date of Test  
 TMD | 1.777 | I. D. NO. | - | 4/62

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.468                         | 0.0079 | 82.6  | 4.471             | 0.0538 | 0.0338         | 20 |         |
| 8                       | 1.540                         | 0.0087 | 86.7  | 4.359             | -      | -              | 20 | (1)     |
| 16                      | 1.639                         | 0.0105 | 92.2  | 4.510             | 0.0489 | 0.0329         | 20 |         |
| 32                      | 1.710                         | 0.0054 | 96.2  | 5.748             | 0.0330 | 0.0229         | 20 |         |
| 64                      | 1.752                         | 0.0046 | 98.6  | 6.642             | 0.0531 | 0.0341         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zona.



SMALL SCALE GAP TEST (SSGT) DATA  
 RDX/CA-ST (97.5/2.5)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (97.5/2.5)

X NO.: 353 ID: Z NO.: SSGT LOAD ORDER NO.: 793

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/30/61

LOT NO.:

INITIAL QUANTITY: \*

BATCH NO.: 86-369-45

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (1/2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\frac{1}{2}$  = cm

s = log units

n =

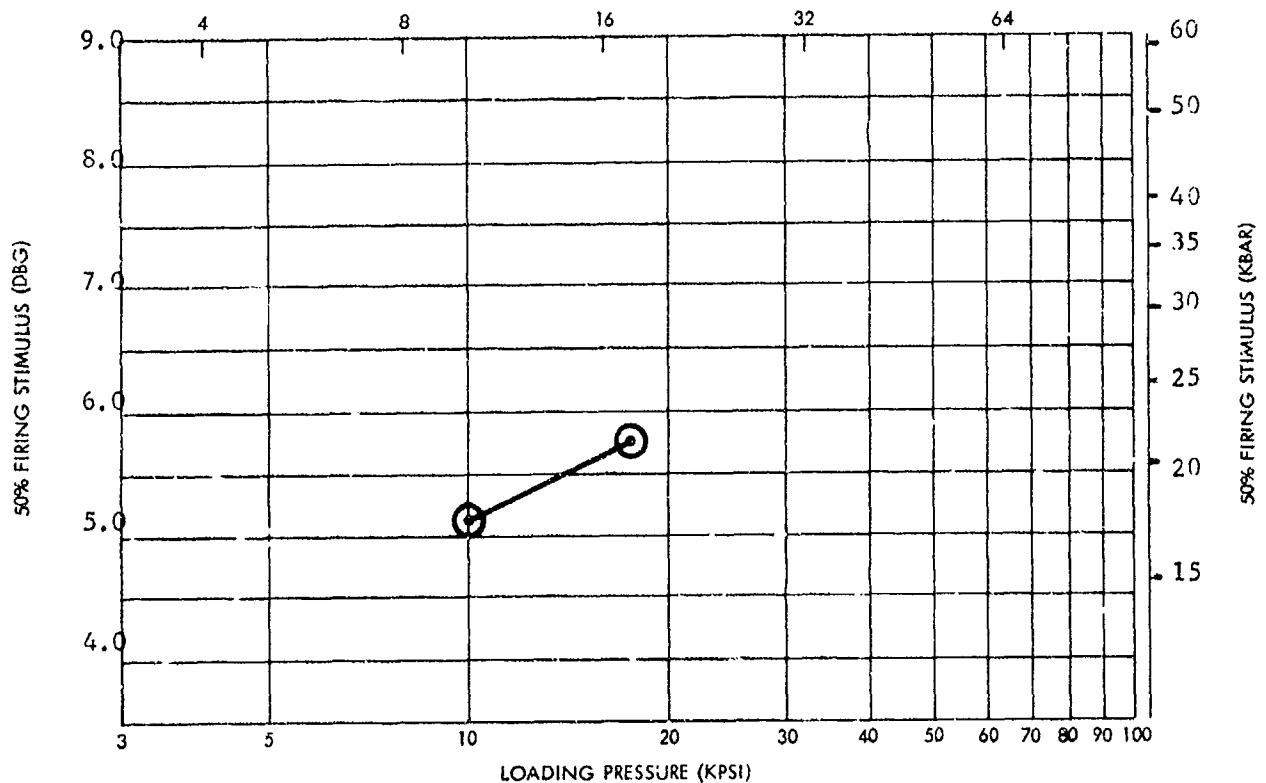
Remarks

\*Approximately 200 pounds,  
made in two 100-pound batches  
blended together; manufactured  
for NOL Corona. NOL-WO received  
1 pound for calibration. Specified  
Calcium Stearate content was 2.8%.  
Analysis for % Calcium Stearate was  
 $1.65 \pm 0.06$ .

|           |   |           |            |              |
|-----------|---|-----------|------------|--------------|
| EXPLOSIVE | <b>RD<del>X</del>/CA-ST, (97.2/2.8)</b> | X NO.     | <b>209</b> | Date of Test |
| TMD       | -                                       | I. D. NO. | -          | <b>10/59</b> |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |               | % TMD    | SENSITIVITY (DBG) |               |                |           | REMARKS    |
|-------------------------|-------------------------------|---------------|----------|-------------------|---------------|----------------|-----------|------------|
|                         | AVG.                          | s             |          | AVG.              | g             | s <sub>m</sub> | N         |            |
| <b>10.0</b>             | <b>1.614</b>                  | <b>0.0050</b> | <b>-</b> | <b>5.136</b>      | <b>0.0257</b> | <b>0.0114</b>  | <b>95</b> |            |
| <b>17.5</b>             | <b>1.689</b>                  | <b>0.0037</b> | <b>-</b> | <b>5.785</b>      | <b>0.1492</b> | <b>0.0491</b>  | <b>46</b> | <b>(1)</b> |
|                         |                               |               |          |                   |               |                |           |            |
|                         |                               |               |          |                   |               |                |           |            |
|                         |                               |               |          |                   |               |                |           |            |
|                         |                               |               |          |                   |               |                |           |            |

**(1) Date of Test - 5/60**



SMALL SCALE GAP TEST (SSGT) DATA

RD~~X~~/CA-ST, (97.2/2.8)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (97.2/2.8)

X NO.: 209 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 9/6/55

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (5 or 50% point)

HOL: WE Division

(Type 12 Tools; 2.5 Kg wt; Sandpaper)

Bldg 318

DATE OF TEST

(Canter, Reynolds)

$\bar{x}$  = cm

s = log units

n =

Remarks

(1) RDX X NO. 189 "Chemical Precipitation Method. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

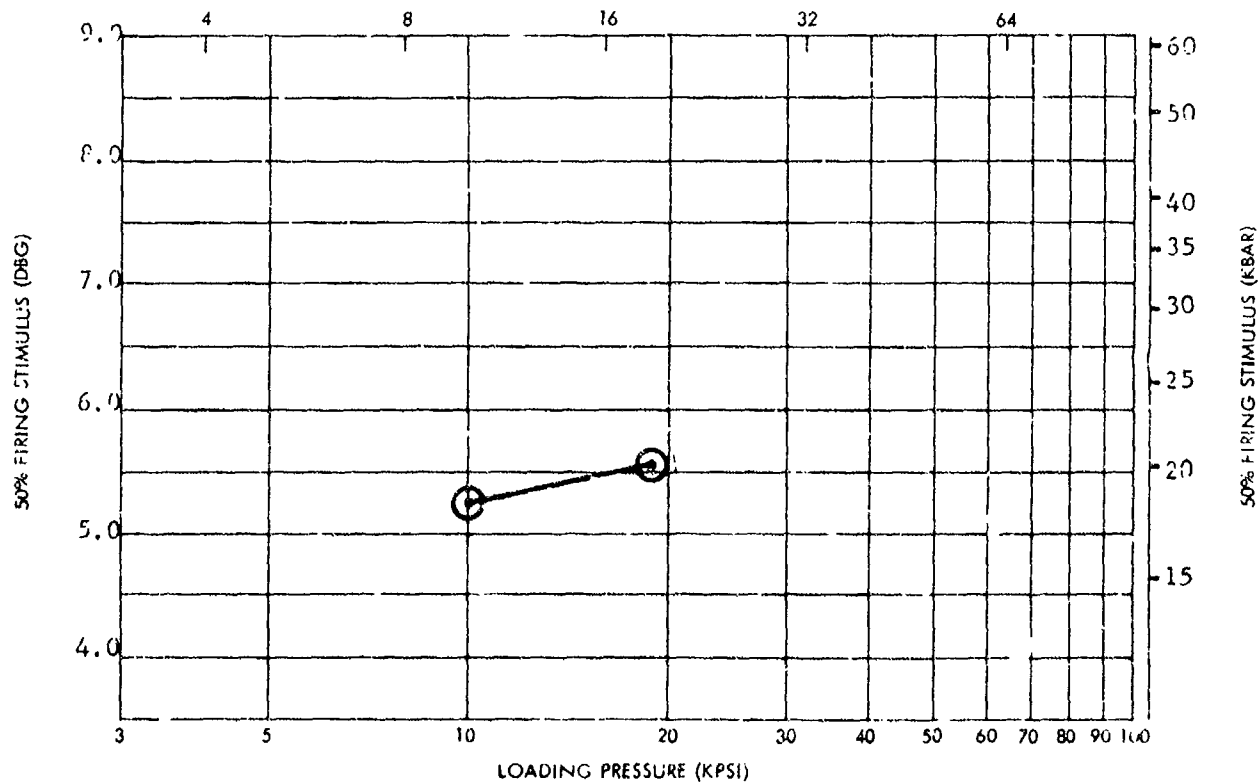
\*Probably it should be Bldg 318, not Bldg 312.

NOLTR 73-132

EXPLOSIVE RDX/CA-ST, (97.2/2.8) X NO. 282  
TMD - I. D. NO. -

ts of Test  
12/59

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10                            | 1.608                            | 0.0064 | -     | 5.244             | 0.0240 | 0.0110         | 46 |         |
| 19                            | 1.680                            | 0.0048 | -     | 5.541             | 0.1008 | 0.0359         | 42 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST, (97.2/2.8)

G1j1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX Calcium Stearate (97.2/2.8)

X NO.: 282      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 8/26/59

LOT NO.:

INITIAL QUANTITY: 4 pounds

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 318

IMPACT SENSITIVITY (§ cr 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ =      cm

s =      log units

n =

Remarks

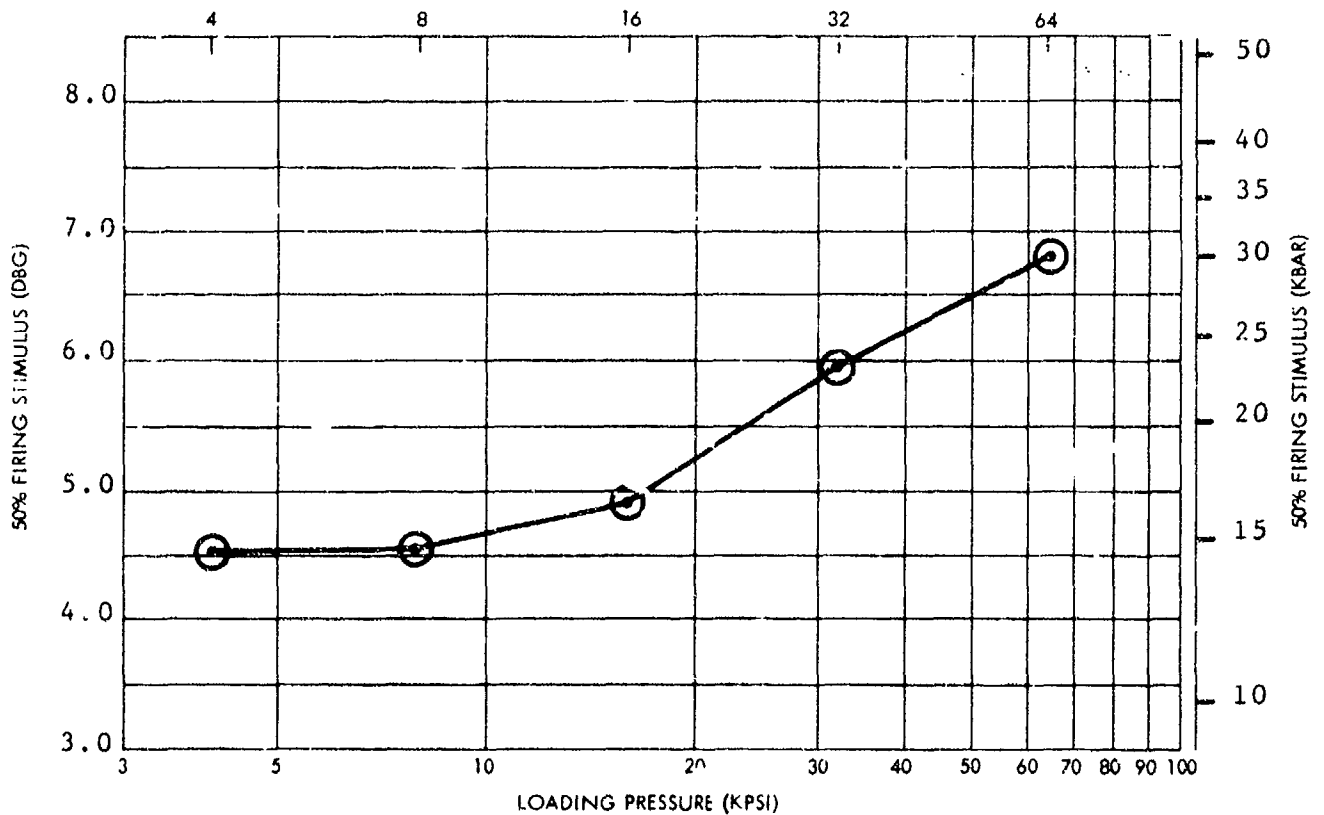
(1) RDX X NO. 189 "Chemical Precipitation Method. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

\*Probably it should be Bldg 318, not Bldg 312.

|           |                      |           |     |              |
|-----------|----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (96.7/3.3) | X NO.     | 354 | Date of Test |
| TMD       | 1.767                | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.482                         | 0.0045 | 83.8  | 4.538             | 0.0849 | 0.0497         | 20 |         |
| 8                       | 1.562                         | 0.0106 | 88.4  | 4.558             | 0.0423 | 0.0287         | 20 |         |
| 16                      | 1.653                         | 0.0038 | 93.5  | 4.901             | -      | -              | 20 | (1)     |
| 32                      | 1.716                         | 0.0020 | 97.1  | 5.963             | -      | -              | 20 | (1)     |
| 64                      | 1.742                         | 0.0034 | 98.6  | 6.817             | 0.0338 | 0.0256         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone.



SMALL SCALE CAP TEST (SSGT) DATA  
RDX/CA-ST (96.7/3.3)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (96.7/3.3)

X NO.: 354 ID: Z NO.: SSGT LOAD ORDER NO.: 794

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/30/61

LOT NO.:

INITIAL QUANTITY: \*

BATCH NO.: 96-369-6/7

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (1/2 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

1/2 = cm

s = log units

n =

Remarks

\*Approximately 200 pounds, made in two 100-pound sub-batches blended together; manufactured for NOL Corona. NOL-WO received 1 pound for calibration. Specified Calcium Stearate content was 4.0%. Analysis for % Calcium Stearate was  $3.34 \pm 0.14$ .

G 1 k 2

4 Sep 1973

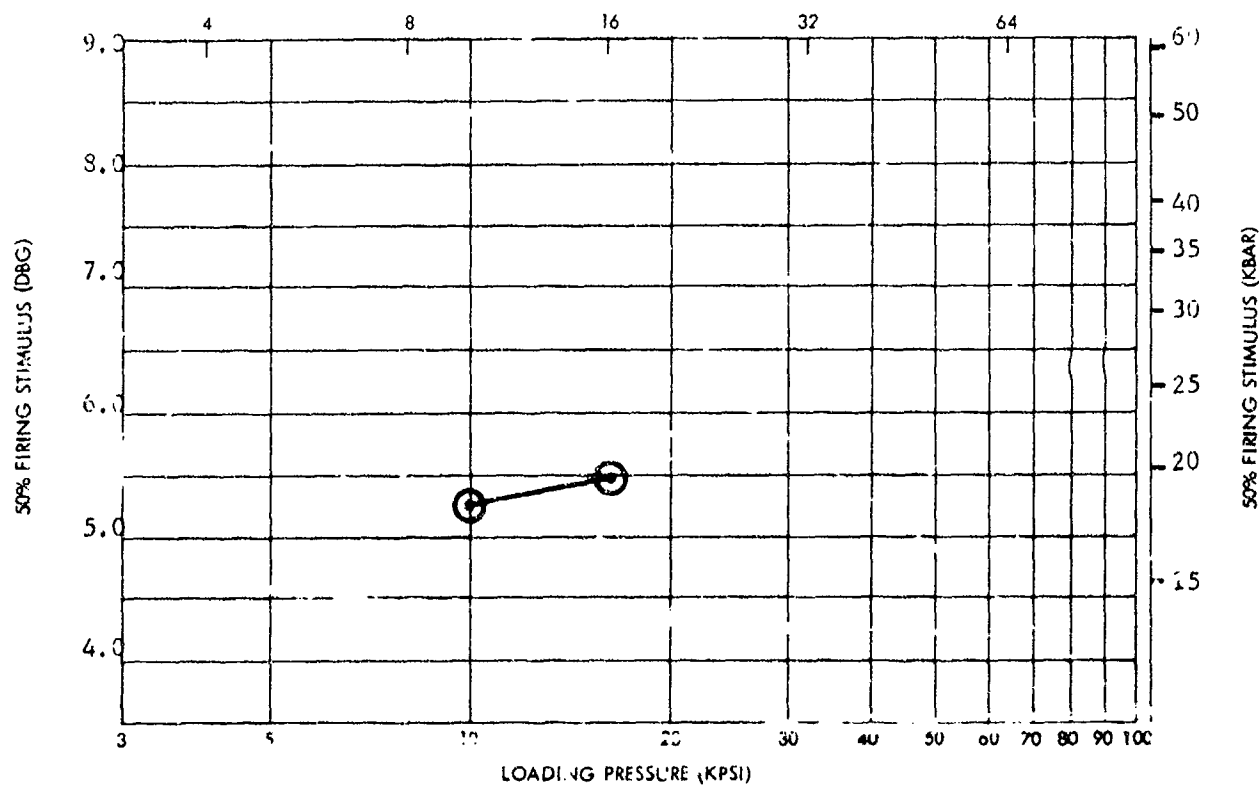


NOLTR 73-132

EXPLOSIVE BDX/CA-ST, (96/4) X NO. 210 Date of Test 10/59  
TMD - I. D. NO. -

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10                      | 0.619                         | 0.0053 | -     | 5.251             | 0.0558 | 0.0193         | 96 |         |
| 16.3                    | 1.679                         | 0.0023 | -     | 5.494             | 0.0285 | 0.0121         | 66 | (1)     |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of Test - 7/60



SMALL SCALE GAP TEST (SSGT) DATA

RDX/CA-ST, (96/4)

G111

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (96.0/4.0)

X NO.: 210      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 9/7/55

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 318  
(Canter, Reynolds)

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ =      cm

s =      log units

n =

Remarks

(1) RDX X NO. 189 "Chemical Precipitation Method. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

\*Probably it should be Bldg 318, not Bldg 312.

NOLTR 73-132

EXPLOSIVE **RDX/CA-ST, (96/4)**

X NO. **283**

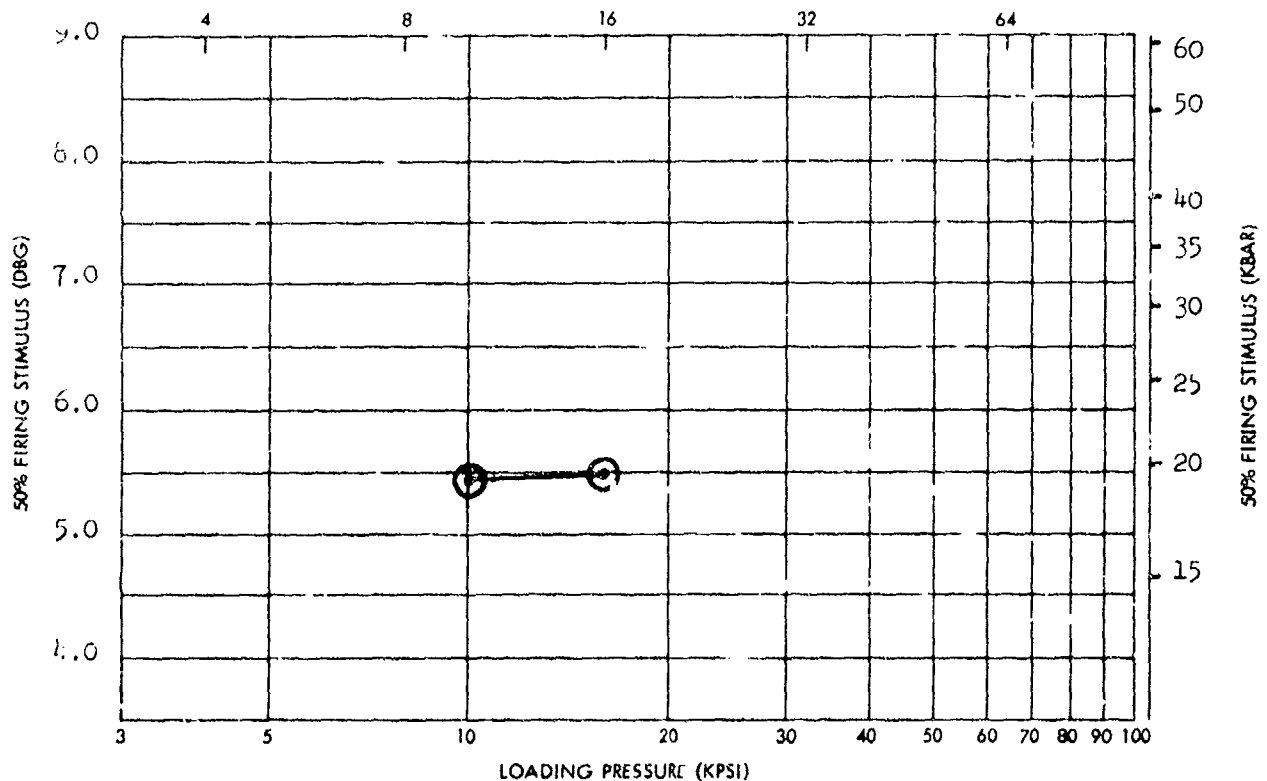
Date of Test  
**12/59**

TMD **-**

I. D. NO. **-**

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10                            | 1.678                            | 0.0026 | -     | 5.459             | 0.0032 | 0.0287         | 46 |         |
| 16                            | 1.675                            | 0.0043 | -     | 5.493             | 0.0529 | 0.0200         | 46 | (1)     |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) Date of test - 7/60



SMALL SCALE GAP TEST (SSGT) DATA

**RDX/CA-ST, (96/4)**

G1m1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (96.0/4.0)

X NO.: 283 ID: Z NO.: 285 SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/26/58

LOT NO.:

INITIAL QUANTITY: 5 pounds

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 318

IMPACT SENSITIVITY (% or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

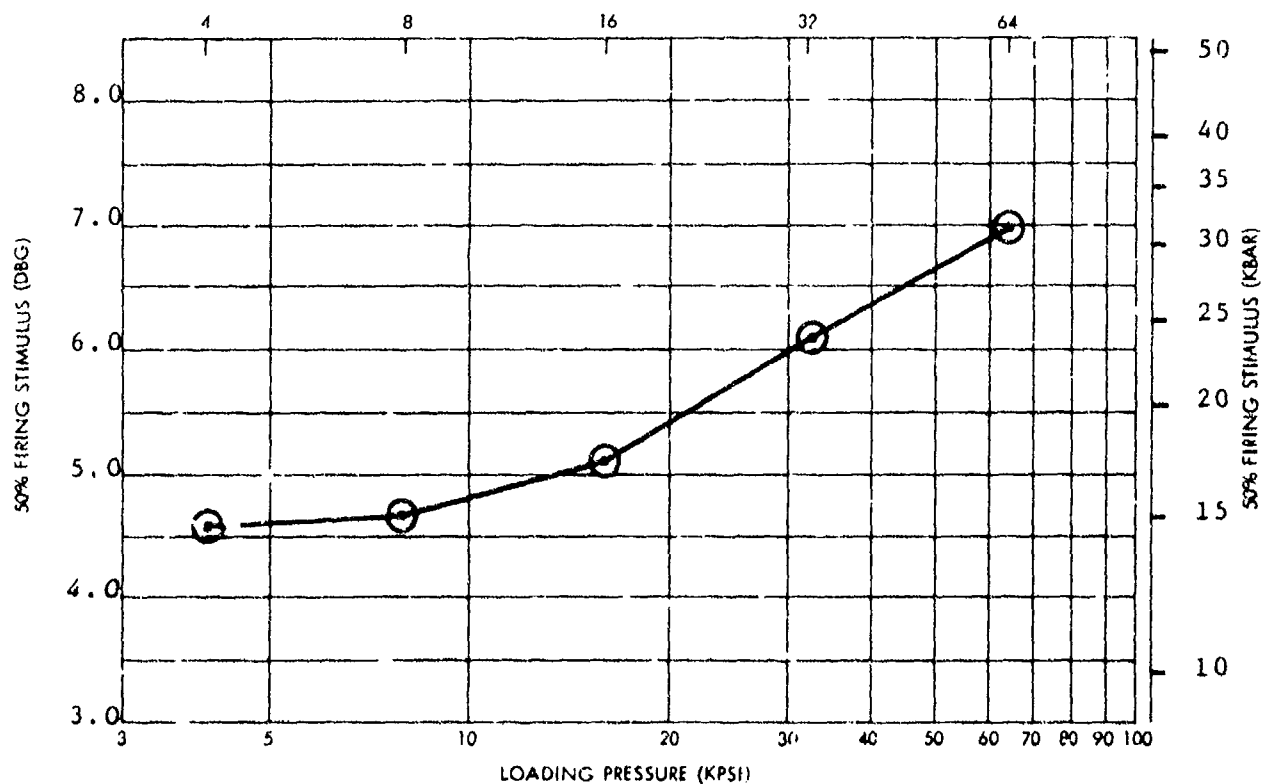
G 1 m 2

4 Sep 1973

NOLTR 73-132

|           |                      |           |     |              |
|-----------|----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (95.0/5.0) | X NO.     | 358 | Date of Test |
| TMD       | 1.745                | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.487                         | 0.0076 | 85.2  | 4.584             | 0.0391 | 0.0280         | 20 |         |
| 8                       | 1.566                         | 0.0052 | 89.7  | 4.662             | 0.0693 | 0.0426         | 20 |         |
| 16                      | 1.652                         | 0.0028 | 94.6  | 5.103             | 0.0286 | 0.0232         | 20 |         |
| 32                      | 1.701                         | 0.0017 | 97.5  | 6.087             | 0.0457 | 0.0327         | 20 |         |
| 64                      | 1.727                         | 0.0054 | 99.0  | 6.981             | 0.1467 | 0.0792         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (95.0/5.0)

Gln1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (95.0/5.0)

X NO.: 358 ID: Z NO.: SSGT LOAD ORDER NO.: 795

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/31/61

LOT NO.:

INITIAL QUANTITY: \*

CATCH NO.: 86-369-8/9/10

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

s = cm

s = log units

n =

Remarks

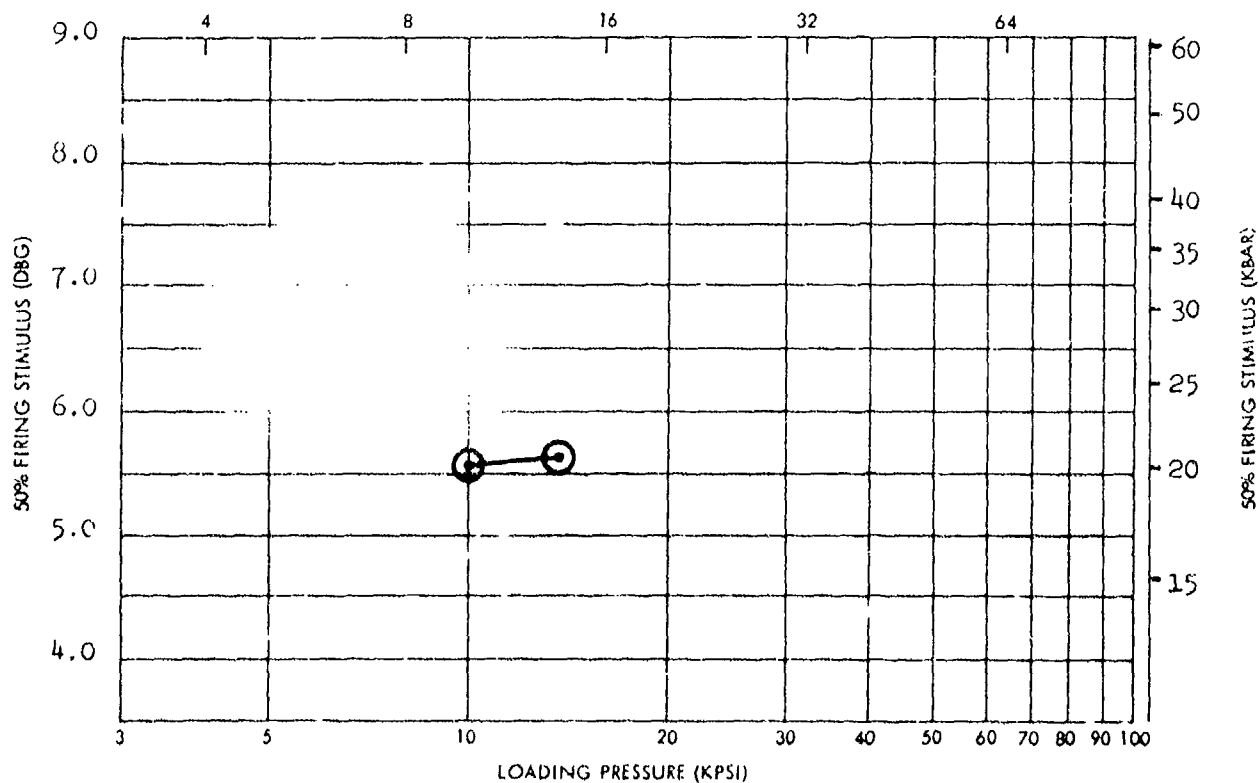
\*Approximately 300 pounds,  
made in three 100-pound sub-batches  
blended together; manufactured for  
NOL Corcoran. NOL-WO received  
1 pound for calibration.  
Specified Calcium Stearate content  
was 5.6%. Analysis for % Calcium  
Stearate was  $4.99 \pm 0.28$ .

EXPLOSIVE RDX/CA-ST, (94.4/5.6) X NO. 211  
 TMD - I. D. NO. -

Date of Test  
10/54

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10.0                          | 1.622                            | 0.0040 | -     | 5.574             | 0.0210 | 0.0112         | 96 |         |
| 14.3                          | 1.658                            | 0.0044 | -     | 5.631             | 0.0347 | 0.0139         | 46 | (1)     |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) Date of test - 9/60



SMALL SCALE GAP TEST (SSGT) DATA  
 RDX/CA-ST, (94.4/5.6)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (94.4/5.6)

X NO.: 211 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 9/7/55

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 318  
(Canter, Reynolds)

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

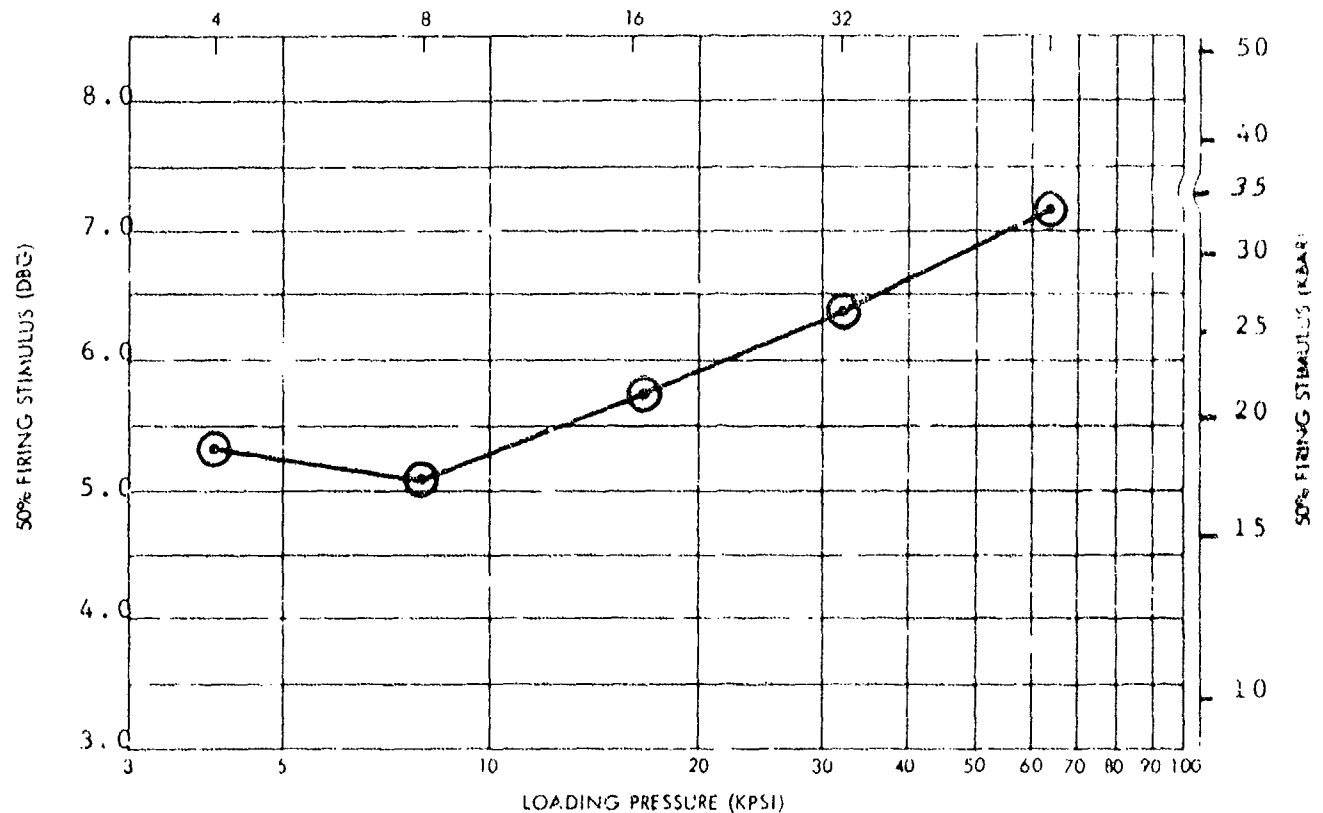
(1) RDX X NO. 189 "Chemical Precipitation Methods. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

\*Probably it should be Bldg 318, not Bldg 312.



|           |                      |           |     |              |
|-----------|----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (93.9/6.1) | X NO.     | 362 | Date of Test |
| TMD       | 1.729                | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.502                         | 0.0076 | 86.7  | 5.311             | 0.1830 | 0.0985         | 20 |         |
| 8                       | 1.568                         | 0.0078 | 90.5  | 5.096             | 0.0631 | 0.0419         | 20 |         |
| 16                      | 1.649                         | 0.0043 | 95.1  | 5.704             | 0.0162 | 0.0146         | 20 |         |
| 32                      | 1.685                         | 0.0023 | 97.2  | 6.374             | 0.3609 | 0.1730         | 20 |         |
| 64                      | 1.701                         | 0.0037 | 98.2  | 7.177             | 0.1167 | 0.0647         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (93.9/6.1)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (93.9/6.1)

X NO.: 362 ID: Z NO.: SSGT LOAD ORDER NO.: 796

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/31/61

LOT NO.:

INITIAL QUANTITY: "

BATCH NO.: 86/369-11/12/13

MANUFACTURED BY:

Ballistics Research Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

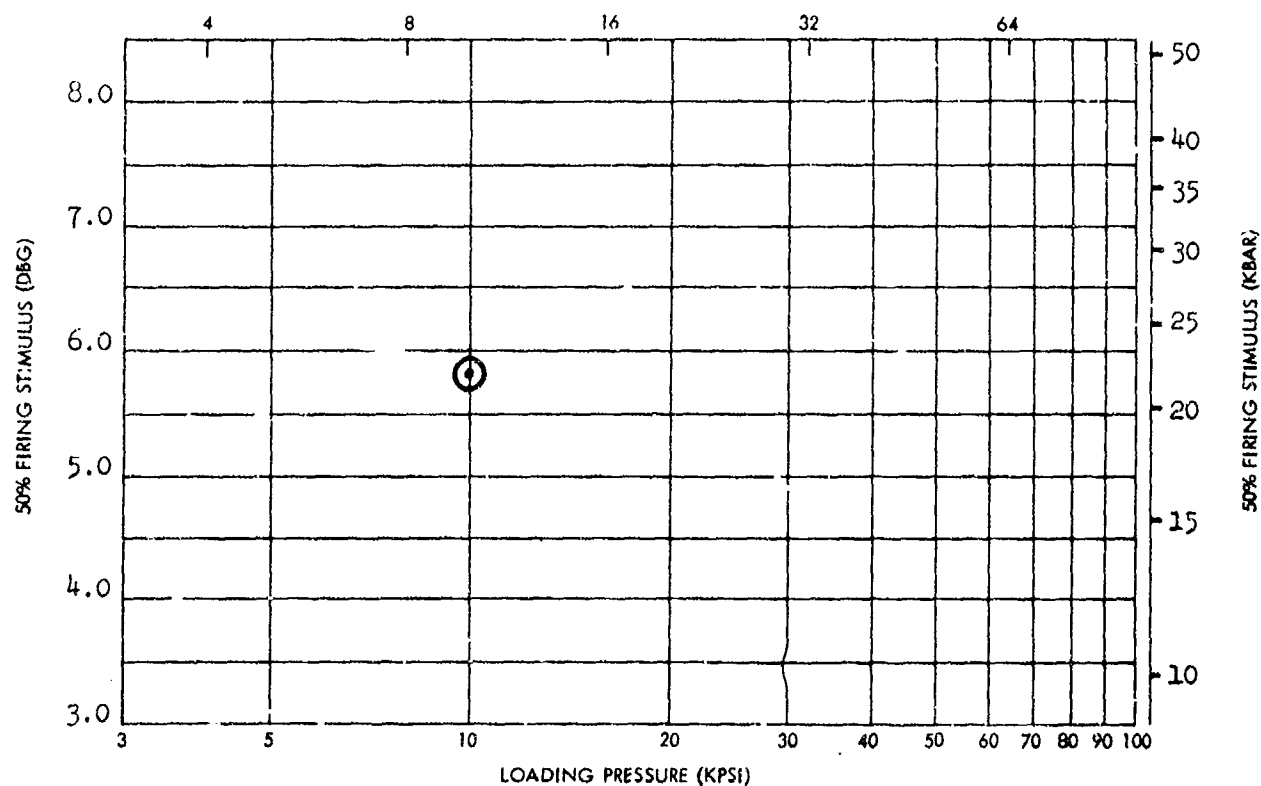
Remarks

\*Approximately 300 pounds, made  
in three 100-pound sub-batches  
blended together; manufactured  
for NOL Corona, NOL-WO received  
1 pound for calibration.  
Specified Calcium Stearate content  
was 8.0%. Analysis for % Calcium  
Stearate was  $6.07 \pm 0.09$ .

NOLTR 73-132

|           |                          |           |            |              |
|-----------|--------------------------|-----------|------------|--------------|
| EXPLOSIVE | <b>RDX/CA-ST, (92/8)</b> | X NO.     | <b>212</b> | Date of Test |
| TMD       | -                        | I. D. NO. | -          | <b>10/59</b> |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % IMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10.                     | 1.612                         | 0.0034 | -     | 5.841             | 0.0219 | 0.0145         | 90 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
**RDX/CA-ST, (92/8)**

G1q1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (92.0/8.0)

X NO.: 212      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 9/7/55

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: WE Division  
Bldg 318  
(Canter, Reynolds)

5 = cm

s = log units

n =

Remarks

(1) RDX X NO. 189 "Chemical Precipitation Methods. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

\*Probably it should be Bldg 318, not Bldg 312.

NOLTR 73-132

EXPLOSIVE **RDX/CA-ST, (92/8)**

X NO.

285

Date of Test  
**12/59**

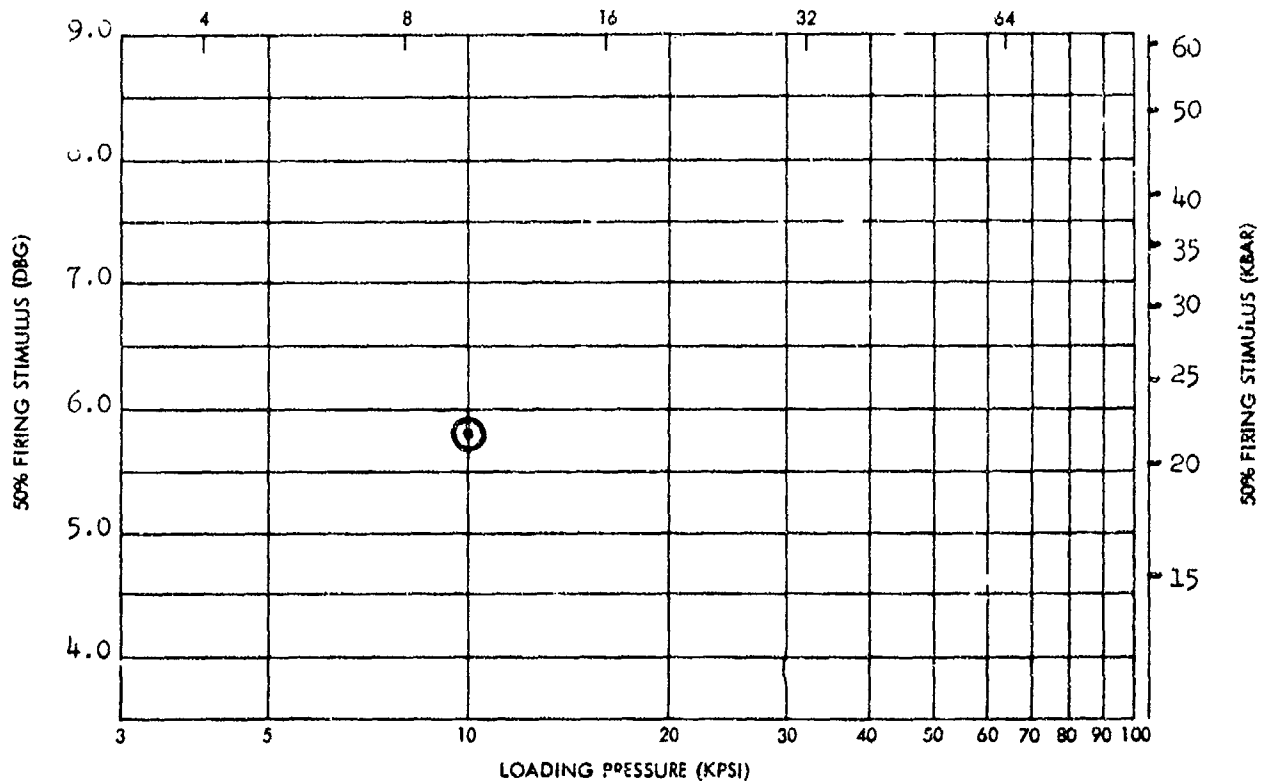
TMD

-

I. D. NO.

-

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10                            | 1.603                            | 0.0027 | -     | 5.818             | 0.0405 | 0.0160         | 46 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
**RDX/CA-ST, (92/8)**

G1r1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (92.0/8.0)

X NO.: 285 ID: Z NO.: 197 SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 7/28/58

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 318

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = 51 cm

s = 0.07 log units

n =

Remarks

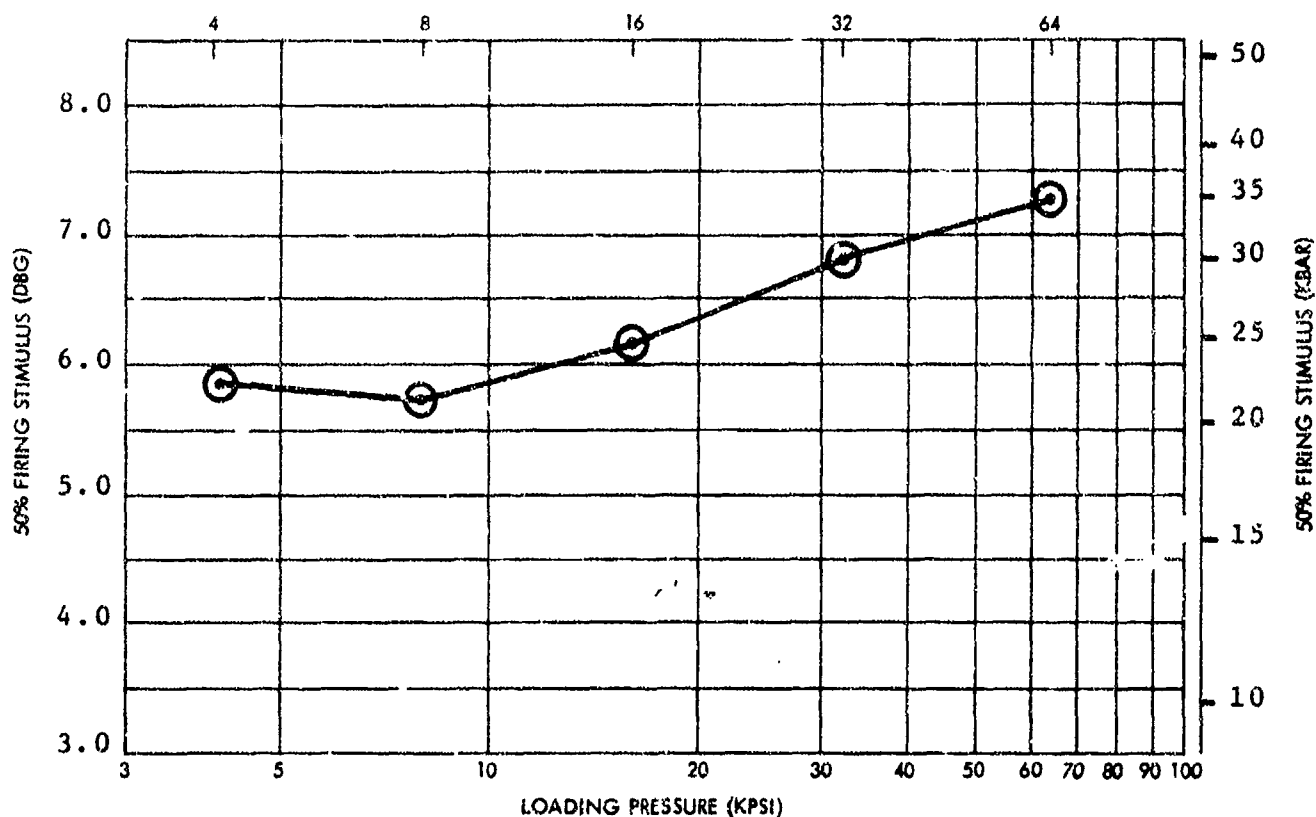
(1) RDX X NO. 189 "Chemical Precipitation Method. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

\*Probably it should be Bldg 318, not Bldg 312.

NOLTR 73-132

|           |                      |           |     |              |
|-----------|----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (90.8/9.2) | X NO.     | 366 | Date of Test |
| TMD       | 1.694                | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.503                         | 0.0040 | 88.7  | 5.859             | 0.0653 | 0.0398         | 20 |         |
| 8                       | 1.564                         | 0.0025 | 92.3  | 5.737             | 0.0223 | 0.0166         | 20 |         |
| 16                      | 1.625                         | 0.0061 | 96.0  | 6.157             | 0.0615 | 0.0409         | 20 |         |
| 32                      | 1.639                         | 0.0059 | 96.8  | 6.805             | 0.0629 | 0.0386         | 20 |         |
| 64                      | 1.650                         | 0.0023 | 97.4  | 7.257             | 0.0066 | 0.0061         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (90.8/9.2)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (90.8/9.2)

X NO.: 366 ID: Z NO.: SSGT LOAD ORDER NO.: 797

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 7/31/61

LOT NO.:

INITIAL QUANTITY: \*

BATCH NO.: 86-369-14/15/16

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (% or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\xi$  = cm

s = log units

n =

Remarks

\*Approximately 300 pounds, made in three 100-pound sub-batches blended together; manufactured for NOL Corona, NOL-WO received 1 pound for calibration. Specified Calcium Stearate content was 12.0%. Analysis for % Calcium Stearate was  $9.16 \pm 0.24$ .

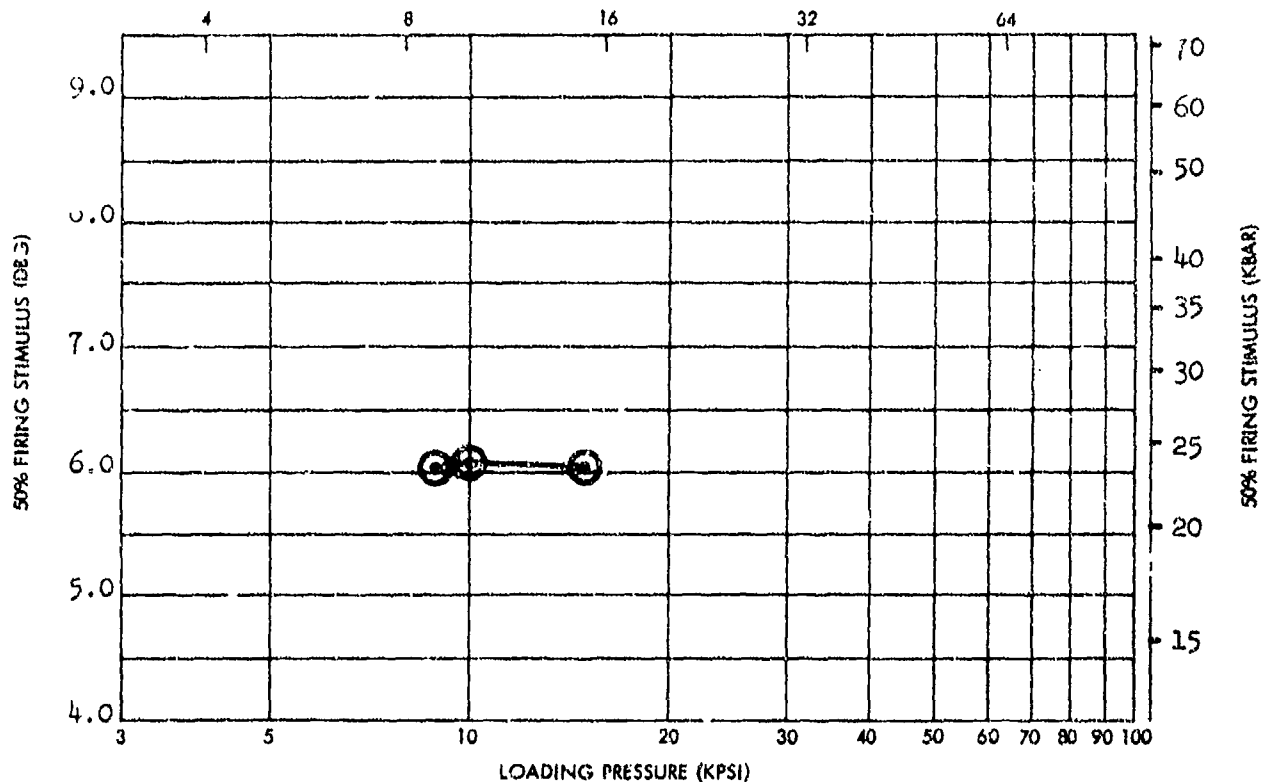


NOLTR 73-132

EXPLOSIVE RDX/CA-S-1, (89/11) X NO. 286 Date of Test 6/60  
 TMD - I. D. NO. -

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 9                       | 1.594                         | 0.0056 | -     | 6.040             | 0.0873 | 0.0301         | 46 |         |
| 10                      | 1.586                         | 0.0063 | -     | 6.087             | 0.0494 | 0.0188         | 46 | (1)     |
| 15                      | 1.609                         | 0.0026 | -     | 6.050             | 0.0151 | 0.0139         | 46 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of Test - 12/59



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST, (89/11)

Glt1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (89.0/11.0)

X NO.: 286 ID: Z NO.: 194 SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 7/28/58

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: WE Division  
Bldg 318

$\xi$  = 73 cm

s = 0.10 log units

n =

Remarks

(1) RDX X NO. 189 "Chemical Precipitation Method. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

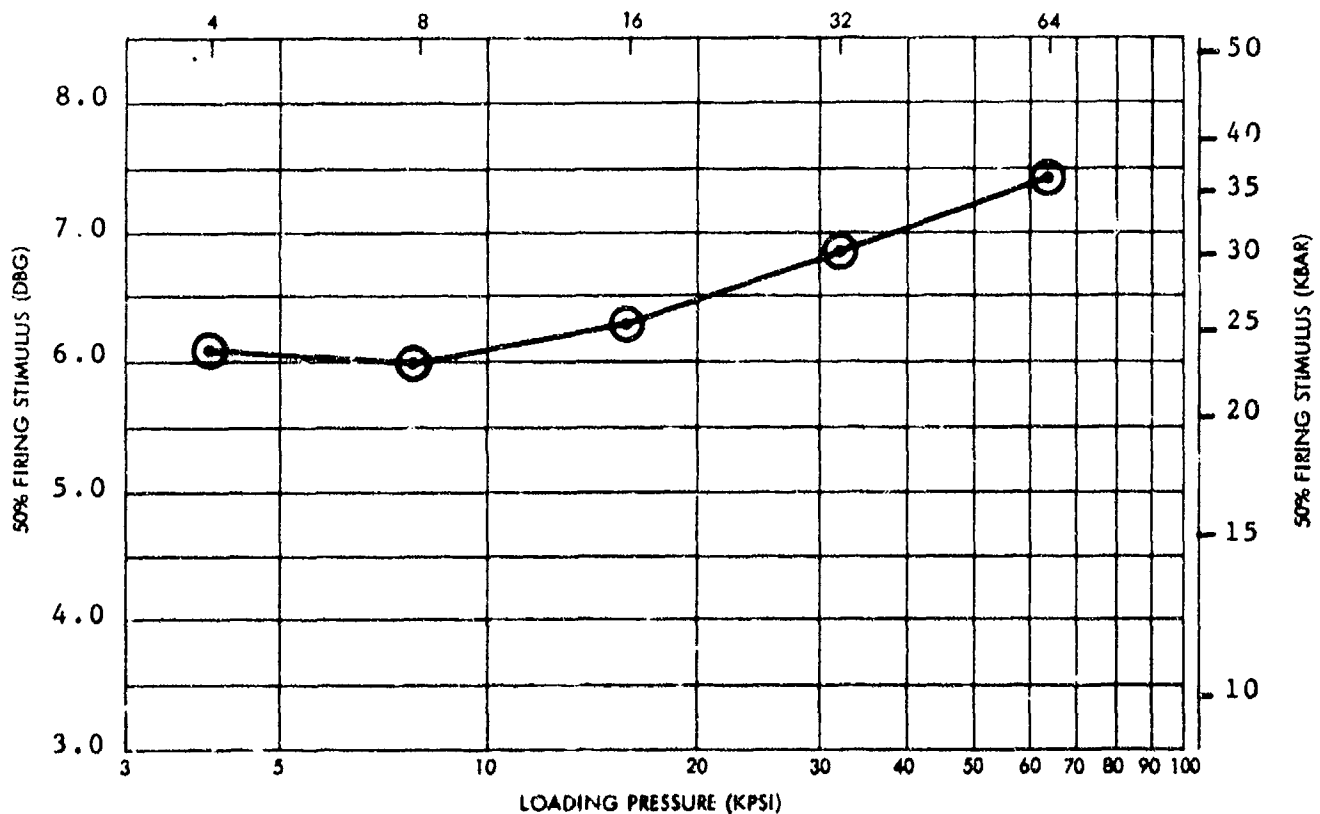
\*Probably it should be Bldg 318, not Bldg 312.

NOLTR 73-132

|           |                       |           |     |              |
|-----------|-----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (88.9/11.1) | X NO.     | 370 | Date of Test |
| TMD       | 1.673                 | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.501                         | 0.0057 | 89.7  | 6.091             | 0.0824 | 0.0474         | 20 |         |
| 8                       | 1.561                         | 0.0027 | 93.3  | 6.000             | 0.0236 | 0.0199         | 20 |         |
| 16                      | 1.601                         | 0.0015 | 95.7  | 6.292             | -      | -              | 20 | (1)     |
| 32                      | 1.618                         | 0.0018 | 96.7  | 6.846             | 0.0697 | 0.0424         | 20 |         |
| 64                      | 1.625                         | 0.0028 | 97.1  | 7.422             | 0.0149 | 0.0137         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) No mixed response zone.



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (88.9/11.1)

Glul

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (88.9/11.1)

X NO.: 370 ID: Z NO.: SSGT LOAD ORDER NO.: 798

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.: 8-369-17/18/19

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY ( $\bar{x}$  or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

\*Approximately 300 pounds,  
made in thee 100-pound  
sub-batches blended together;  
manufactured for NOL Corona.  
NOL-WO received 1/2 pound for  
calibration. Specified  
Calcium Stearate content was  
14.0%. Analysis for %  
Calcium Stearate was 11.05  $\pm$  0.45.

NOLTR 73-132

EXPLOSIVE **RDX/CA-ST, (88.7/11.3)**

X NO. 216

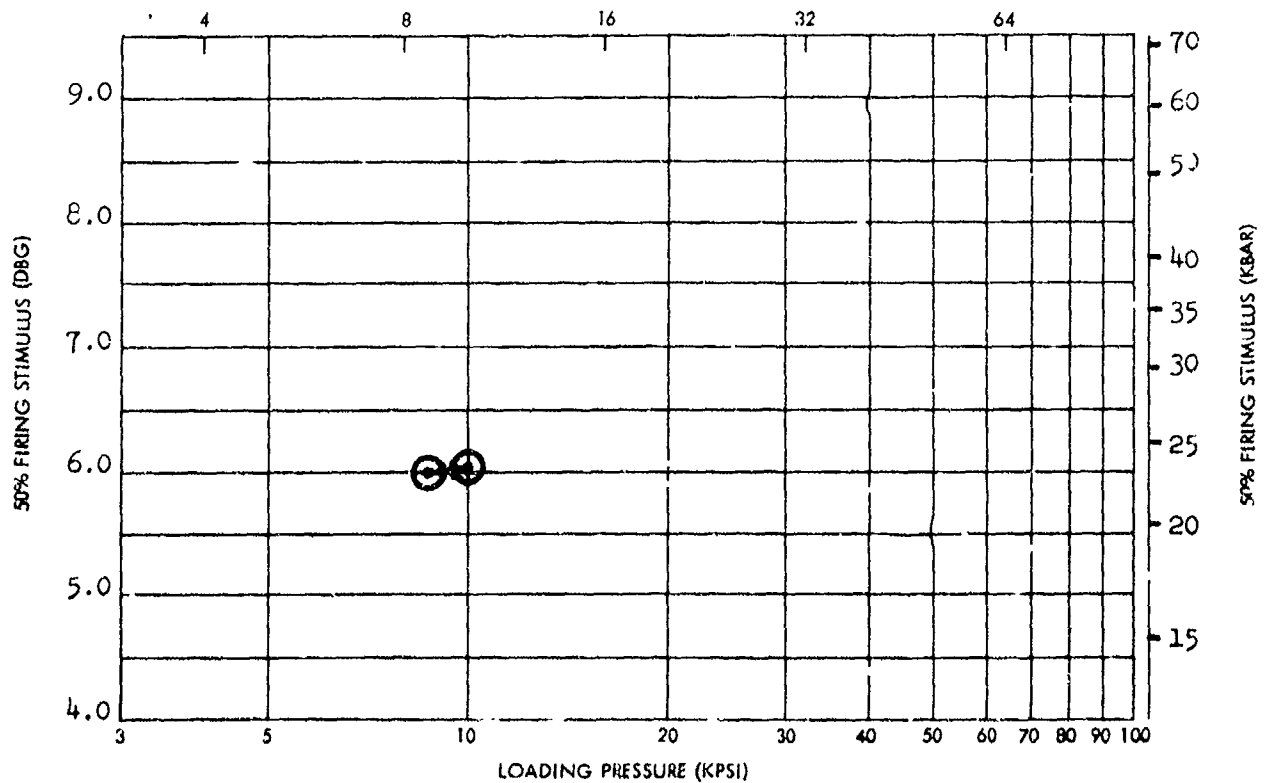
Date of Test  
12/59

TMD -

I. D. NO. -

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8.9                           | 1.589                            | 0.0023 | -     | 6.007             | 0.0655 | 0.0238         | 46 | (1)     |
| 10.0                          | 1.588                            | 0.0033 | -     | 6.044             | 0.0590 | 0.0213         | 46 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) Date of test 9/60



SMALL SCALE GAP TEST (SSGT) DATA  
**RDX/CA-ST, (88.7/11.3)**

G1v1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (88.7/11.3)

X NO.: 216 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 10/15/55

LOT NO.:

INITIAL QUANTITY: 5 kilograms

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: EP Division

g = cm

s = log units

n =

Remarks

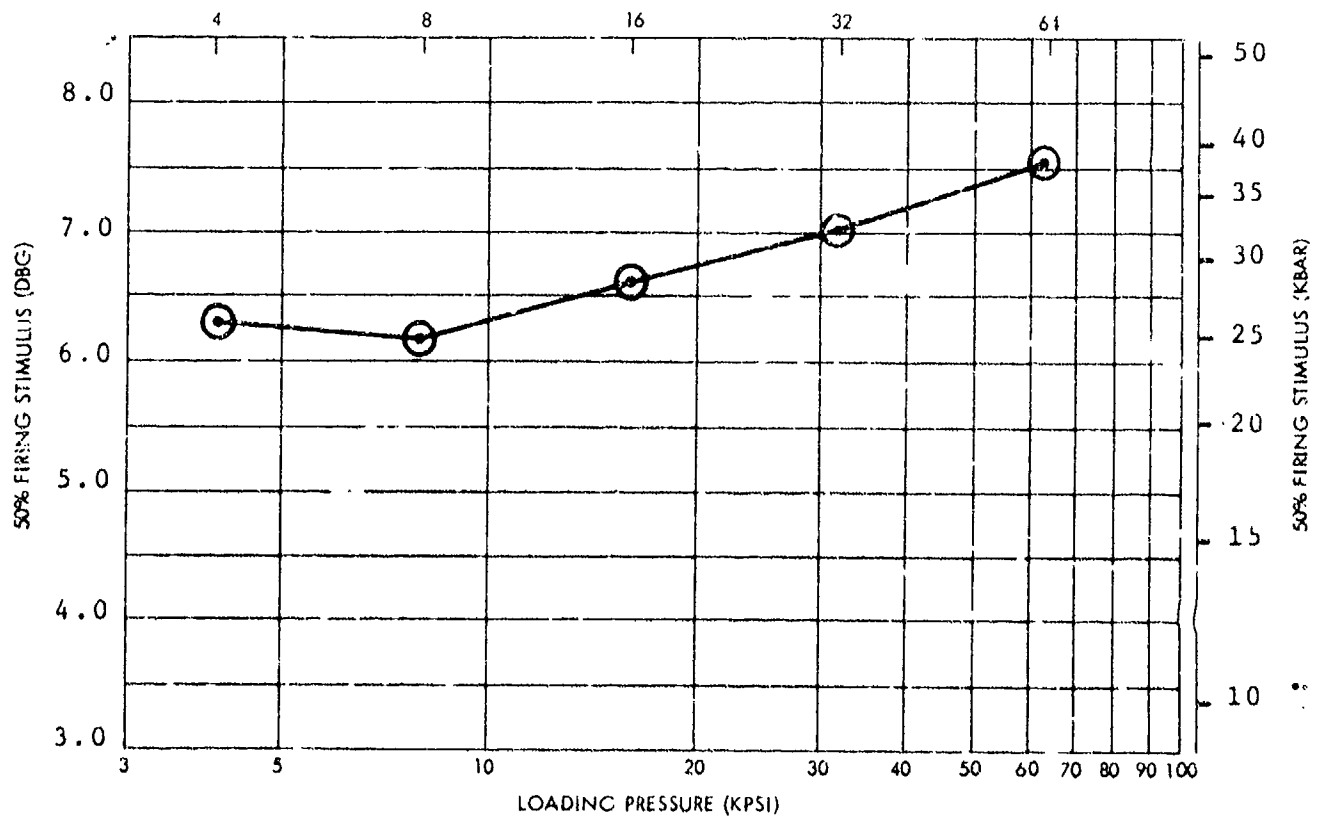
G 1 v 2

4 Sep 1973

NOLTR 73-132

|           |                             |           |     |              |
|-----------|-----------------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (87.2/12.8) X NO. |           | 374 | Date of Test |
| TMD       | 1.653                       | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBO) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.488                         | 0.0069 | 90.0  | 6.290             | 0.0068 | 0.0089         | 20 |         |
| 8                       | 1.546                         | 0.0036 | 93.5  | 6.178             | 0.0569 | 0.0349         | 20 |         |
| 16                      | 1.587                         | 0.0025 | 96.0  | 6.602             | 0.0719 | 0.0426         | 20 |         |
| 32                      | 1.601                         | 0.0013 | 96.9  | 7.018             | 0.0135 | 0.0102         | 20 |         |
| 64                      | 1.609                         | 0.0023 | 97.3  | 7.553             | 0.0431 | 0.0277         | 20 |         |
|                         |                               |        | o     |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/C-ST (87.2/12.8)

Glwl

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (87.2/12.8)

X NO.: 374\* ID:                      % NO.:                      SSGT LOAD ORDER NO.: 799

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/31/61

LOT NO.:

INITIAL QUANTITY: \*\*

BATCH NO.: 8-369-20/21/30

MANUFACTURED BY:

Heistons Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (g or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g =                      cm

s =                      log units

n =

Remarks

\*X-416 is from same 8-369-20/  
21/30 batch.

\*\*Approximately 300 pounds,  
made in three 100-pound sub-  
batches blended together;  
manufactured for NOL Corona.  
NOL-WO received 1 pound for  
calibration. Specified  
Calcium Stearate content was  
16.0%. Analysis for %  
Calcium Stearate was  $12.79 \pm 0.44$ .

G 1 w 2

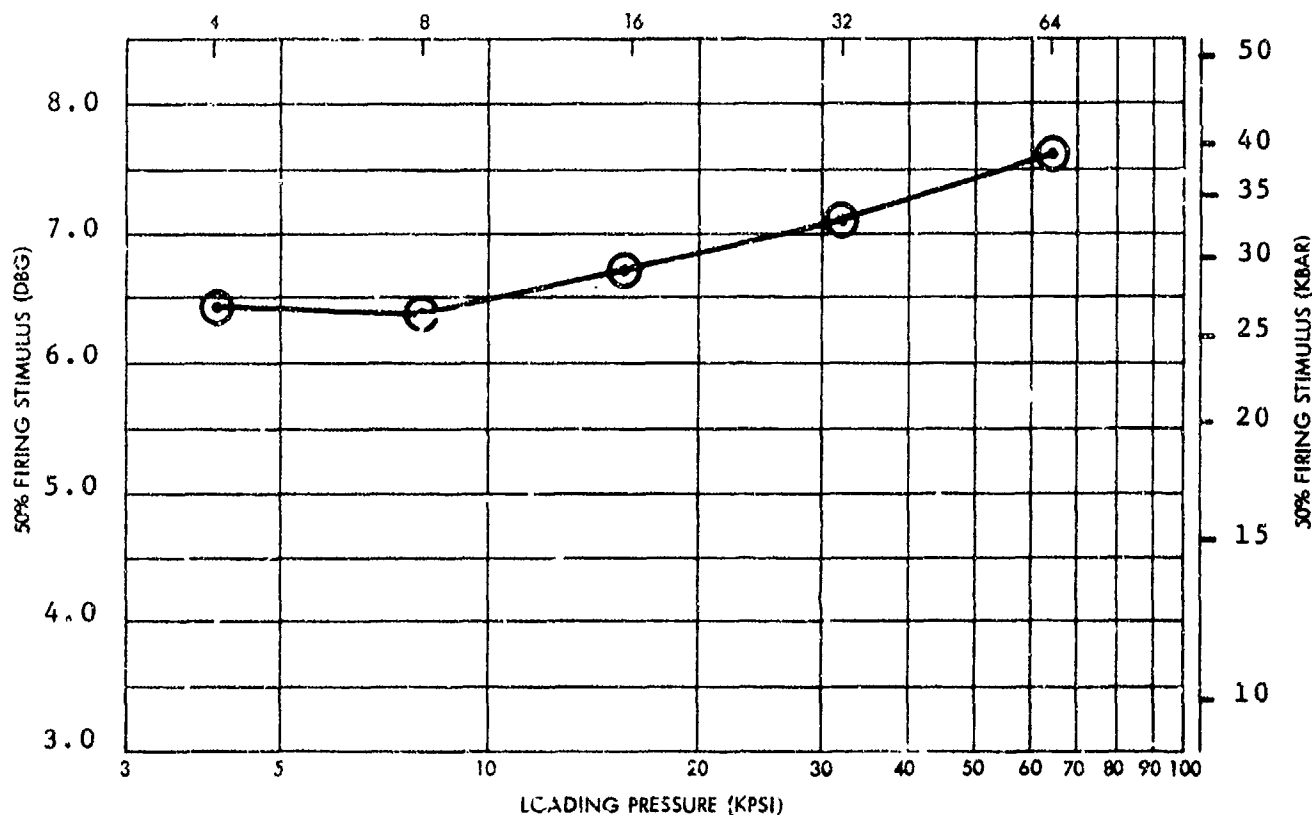
4 Sep 1973



NOLTR 73-132

EXPLOSIVE RDX/CA-ST (85.8/14.2) X NO. 378 Date of Test  
TMD 1.639 I. D. NO. - 4/62

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |        |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|--------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | m      | N  |         |
| 4                       | 1.487                         | 0.0041 | 90.7  | 6.430             | 0.0141 | 0.0125 | 20 |         |
| 8                       | 1.541                         | 0.0023 | 94.0  | 6.359             | 0.0323 | 0.0217 | 20 |         |
| 16                      | 1.578                         | 0.0021 | 96.3  | 6.712             | 0.0067 | 0.0073 | 20 |         |
| 32                      | 1.583                         | 0.0034 | 96.6  | 7.129             | 0.0239 | 0.0370 | 20 |         |
| 64                      | 1.589                         | 0.0029 | 96.9  | 7.615             | 0.0591 | 0.0378 | 20 |         |
|                         |                               |        |       |                   |        |        |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (85.8/14.2)

Glx1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (85.8/14.2)

X NO.: 378 ID: Z NO.: SSGT LOAD ORDER NO.: 800

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/31/61

LOT NO.:

INITIAL QUANTITY: \*

BATCH NO.: 8-369-22/23/31

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

\*Approximately 300 pounds,  
made in three 100-pound sub-  
batches blended together;  
manufactured for NOL Carona.  
NOL-WO received 1 pound for  
calibration. Specified  
Calcium Stearate content was  
18.4%. Analysis for %  
Calcium Stearate was  $14.16 \pm 0.44$ .

G 1 x 2

4 Sep 1973

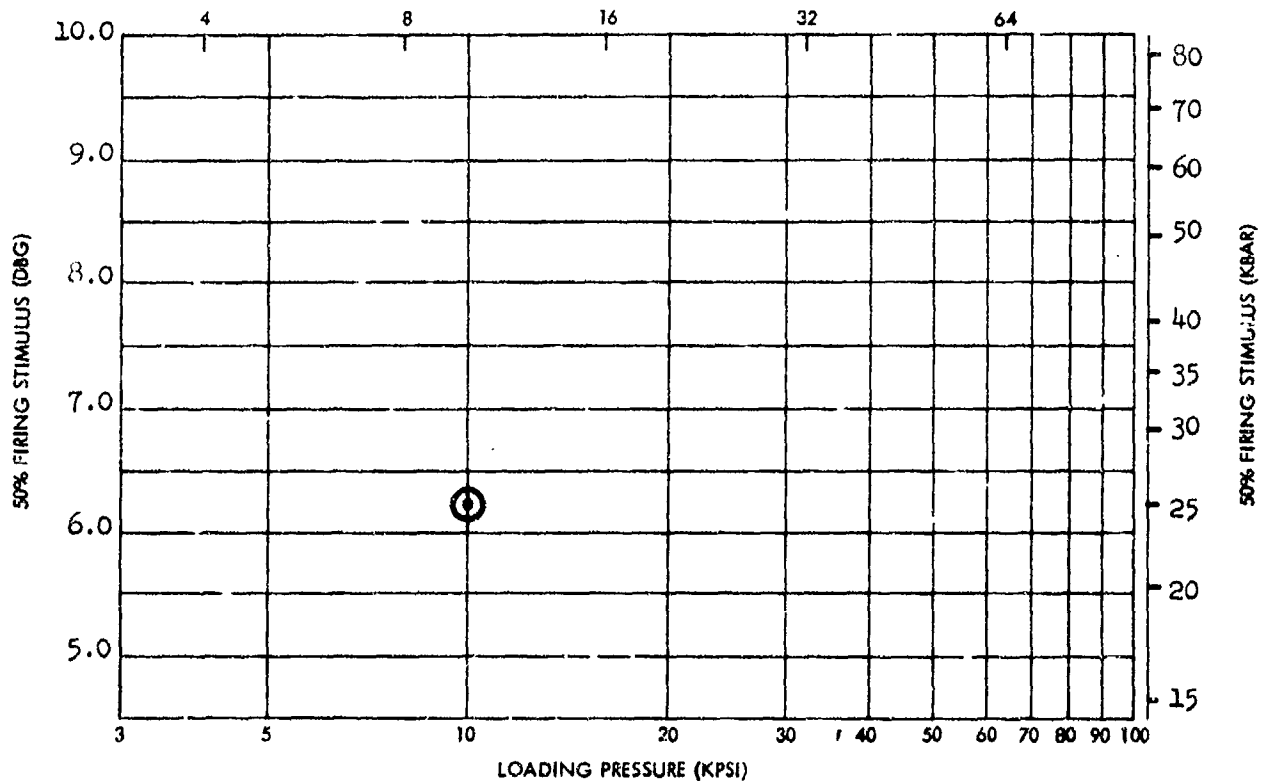
NOLTR 73-132

EXPLOSIVE RDK/CA-ST, (85/15)  
TMD -

X NO. 287  
I. D. NO. -

Date of Test  
**12/59**

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 10                      | 1.559                         | 0.0052 | -     | 6.222             | 0.0175 | 0.0122         | 46 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
**RDK/CA-ST (85/15)**

Gly1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (85.0/15.0)

X NO.: 287 ID: Z NO.: 195 SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 7/28/58

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 318

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

G 1 y 2

4 Sep 1973

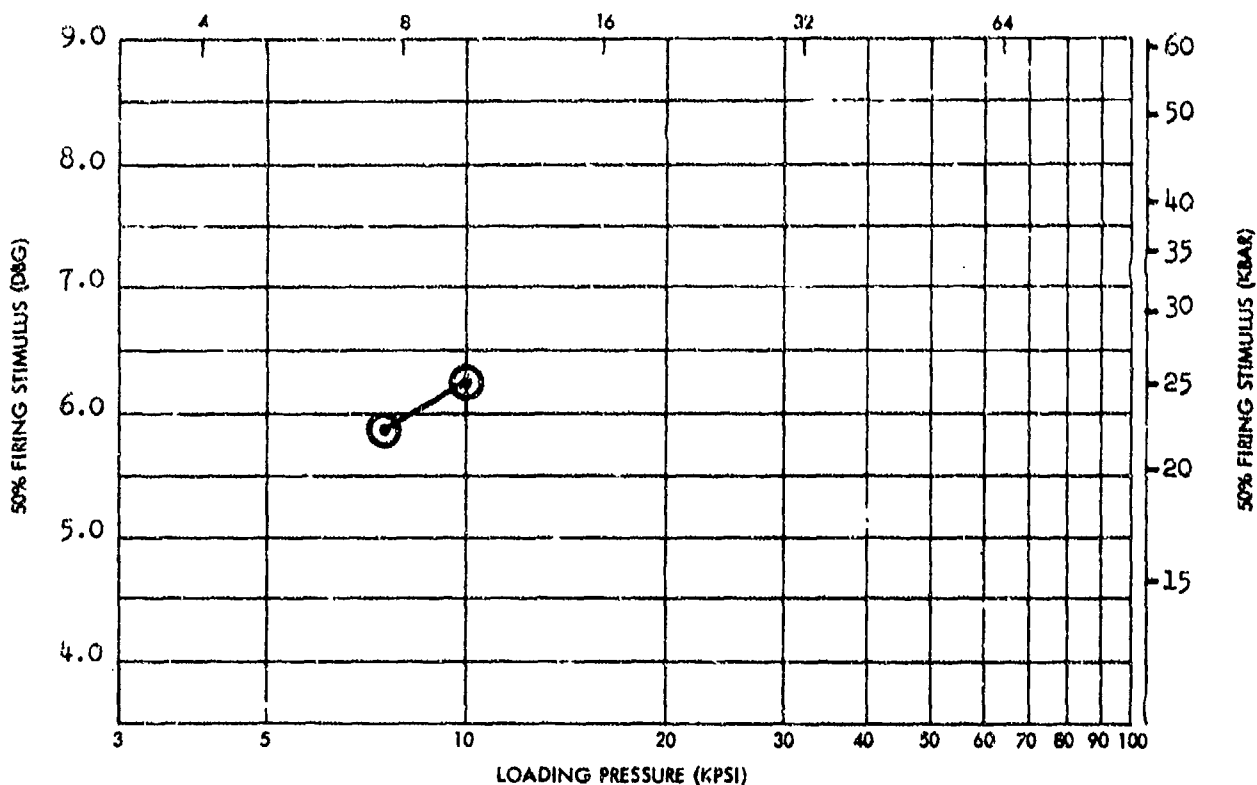
NOLTR 73-132

EXPLOSIVE RDX/CA-ST, (84.2/15.8) X NO. 217  
 TMD - I. D. NO. -

Date of Test  
12/59

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | v <sub>m</sub> | N  |         |
| 7.6                     | 1.563                         | 0.0038 | -     | 5.875             | 0.0535 | 0.0215         | 46 | (1)     |
| 10.0                    | 1.559                         | 0.0025 | -     | 6.247             | 0.0531 | 0.0212         | 46 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of test - 9/62



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST, (84.2/15.8)

G1z1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (84.2/15.8)

X NO.: 217 ID: 3 NO.: 277 SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 10/15/55

LOT NO.:

INITIAL QUANTITY: 5 kilograms

BATCH NO.:

MANUFACTURED BY:

NOL: EP Division

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

5 - cm

s - log units

n -

Remarks

G 1 z 2

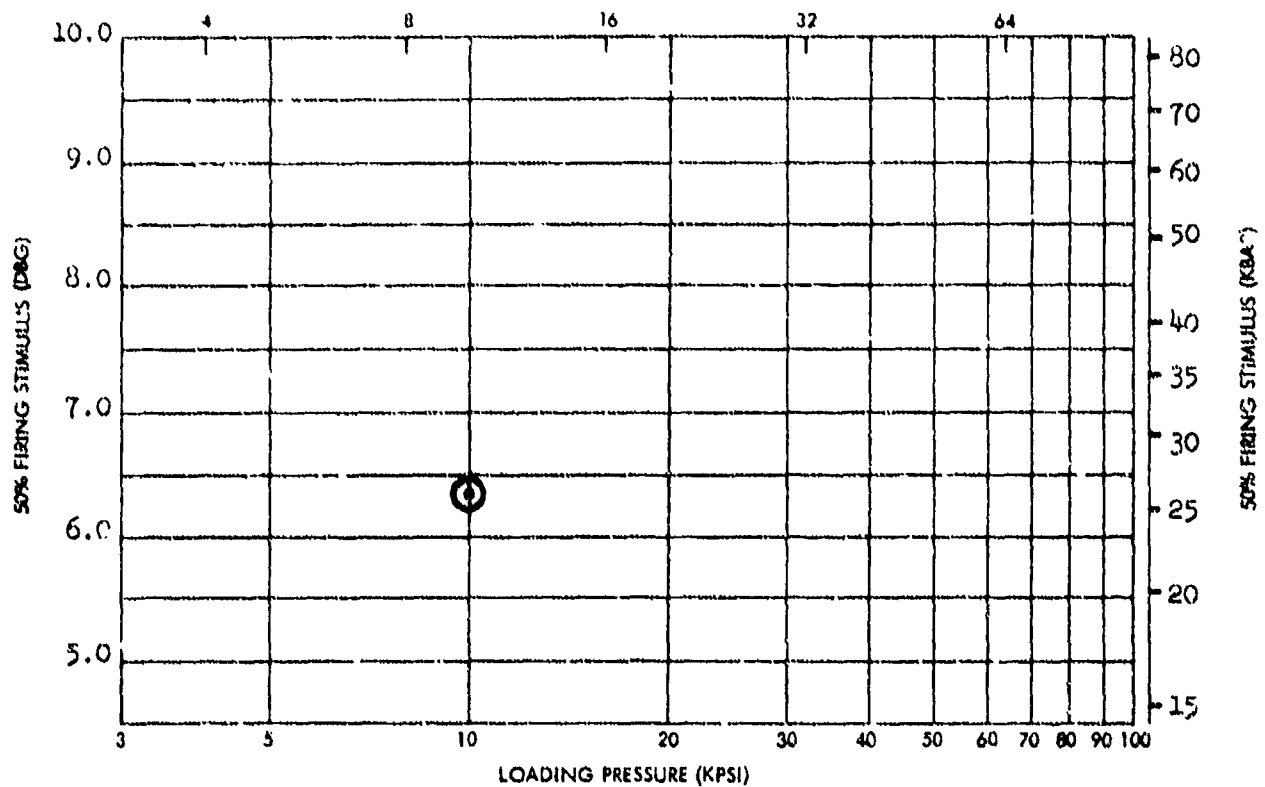
4 Sep 1973

NOLTR 73-132

EXPLOSIVE RDX/CA-ST, (84,2/15.8) X NO. 888  
 TMD - I. D. NO. -

Date of Test  
12/59

| LOADING PRESSURE (NPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |        |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|--------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | %m     | N  |         |
| 10                      | 1.551                         | 0.0176 | -     | 6.384             | 0.1335 | 0.0439 | 46 |         |
|                         |                               |        |       |                   |        |        |    |         |
|                         |                               |        |       |                   |        |        |    |         |
|                         |                               |        |       |                   |        |        |    |         |
|                         |                               |        |       |                   |        |        |    |         |
|                         |                               |        |       |                   |        |        |    |         |
|                         |                               |        |       |                   |        |        |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST, (84,2/15.8)

Glaal

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (84.2/15.8)

X NO.: 288 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 5/29/58

LO<sup>m</sup> NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: WE Division  
Bldg 318

§ = cm

s = log units

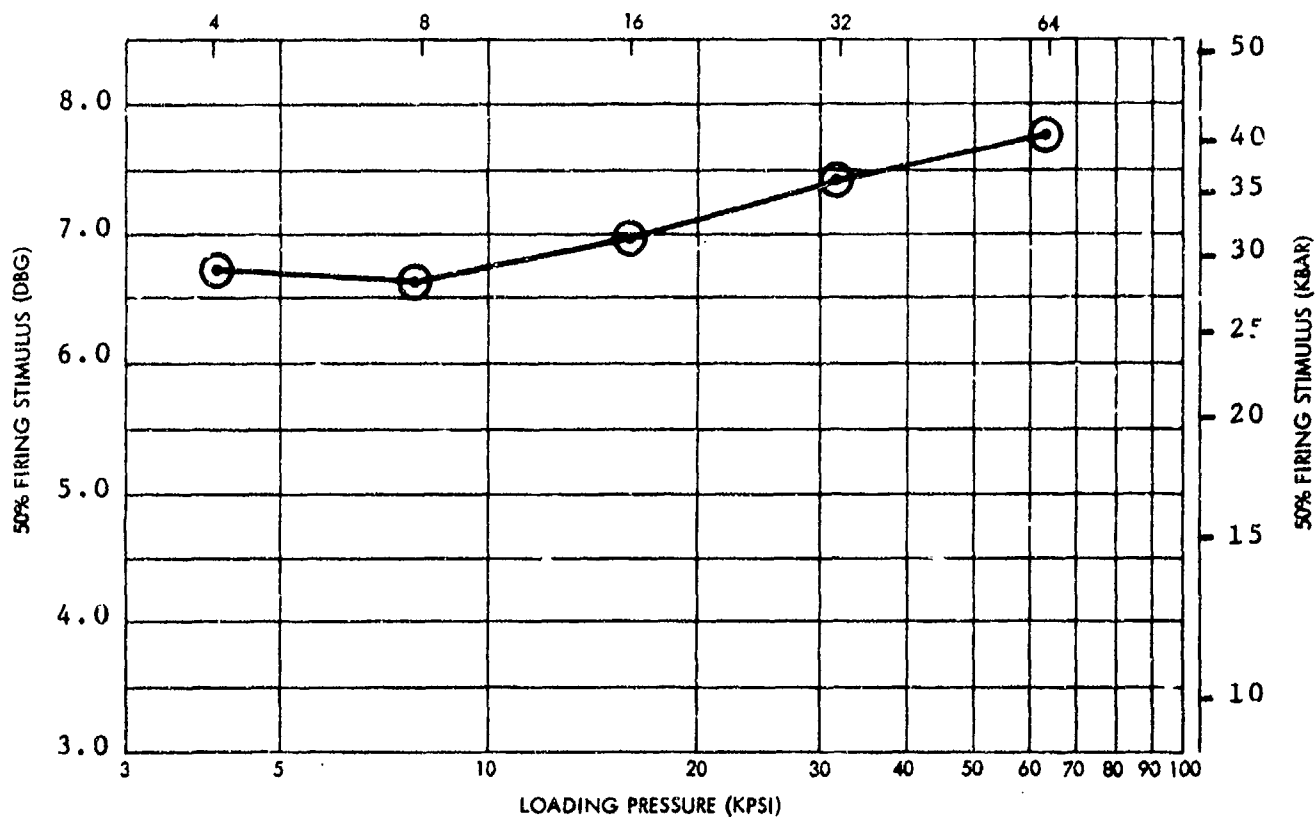
n =

Remarks



EXPLOSIVE RDX/CA-ST (83.4/16.6)X NO. 381 Date of Test  
 TMD 1.612 I. D. NO. - 4/62

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.474                         | 0.0031 | 91.4  | 6.709             | 0.0295 | 0.0214         | 20 |         |
| 8                       | 1.525                         | 0.0025 | 94.6  | 6.625             | 0.0453 | 0.0285         | 20 |         |
| 16                      | 1.554                         | 0.0013 | 96.4  | 6.959             | 0.0088 | 0.0063         | 20 |         |
| 32                      | 1.560                         | 0.0014 | 96.8  | 7.413             | 0.0112 | 0.0126         | 20 |         |
| 64                      | 1.566                         | 0.0026 | 97.2  | 7.763             | 0.0197 | 0.0248         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
 RDX/CA-ST (83.4/16.6)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (83.4/16.6)

X NO.: 381 ID: Z NO.: SSGT LOAD ORDER NO.: 801

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 8/31/61

LOT NO.:

INITIAL QUANTITY: \*

BATCH NO.: 8-369-24/25

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

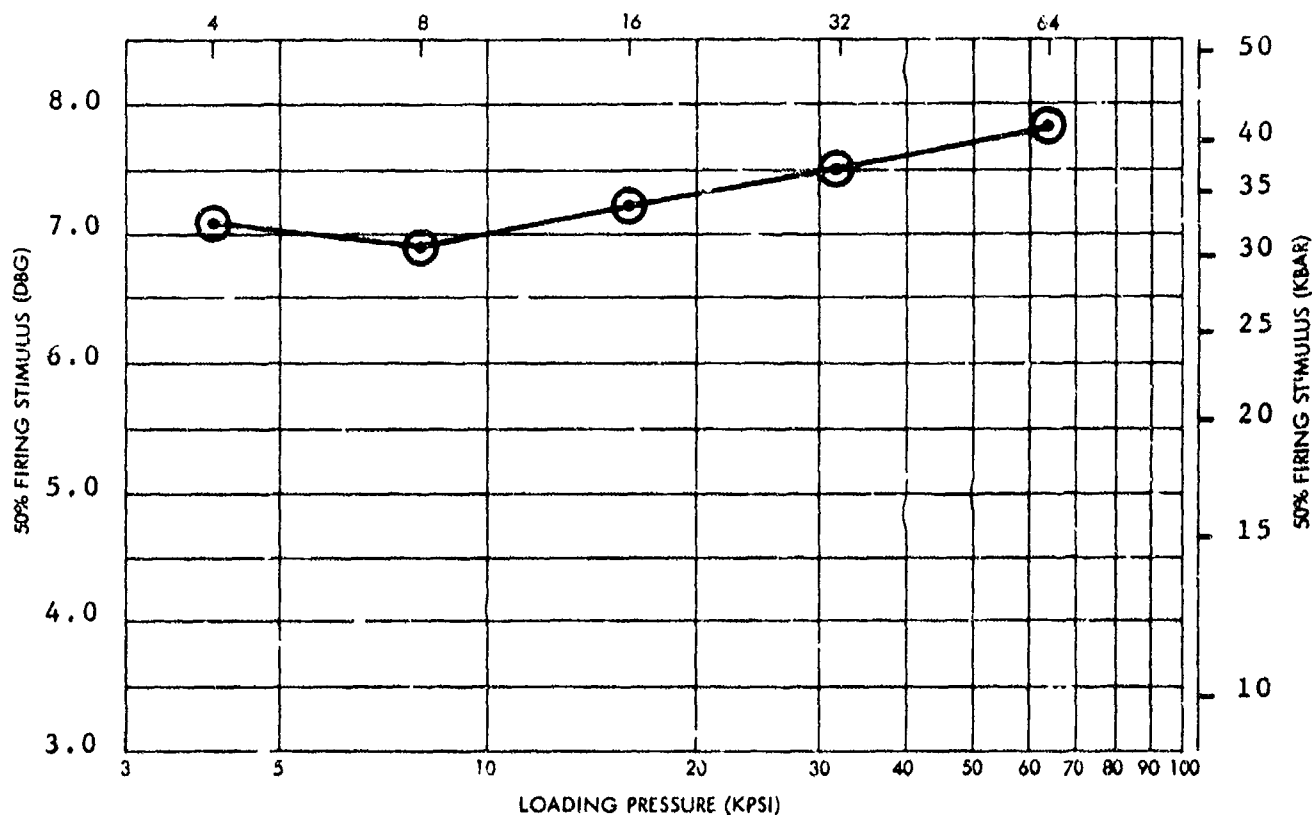
n =

Remarks

\*Approximately 200 pounds, made in two 100-pound batches blended together; manufactured for NOL Corona. NOL-WO received 1 pound for calibration. Specified Calcium Stearate content was 20.8%. Analysis for % Calcium Stearate was  $16.55 \pm 0.31$ .

|           |                       |           |     |              |
|-----------|-----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (81.3/18.7) | X NO.     | 384 | Date of Test |
| TMD       | 1.589                 | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.454                         | 0.0042 | 91.5  | 7.095             | 0.0638 | 0.0407         | 20 |         |
| 8                       | 1.499                         | 0.0035 | 94.3  | 6.900             | 0.0969 | 0.0559         | 20 |         |
| 16                      | 1.521                         | 0.0020 | 95.7  | 7.218             | 0.0712 | 0.0423         | 20 |         |
| 32                      | 1.532                         | 0.0023 | 96.4  | 7.514             | 0.0404 | 0.0253         | 20 |         |
| 64                      | 1.531                         | 0.0038 | 96.3  | 7.832             | 0.0937 | 0.0511         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (81.3/18.7)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (81.3/18.7)

X NO.: 384 ID: Z NO.: SSGT LOAD ORDER NO.: 804

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.: 8-369-26/27

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

f = cm

s = log units

n =

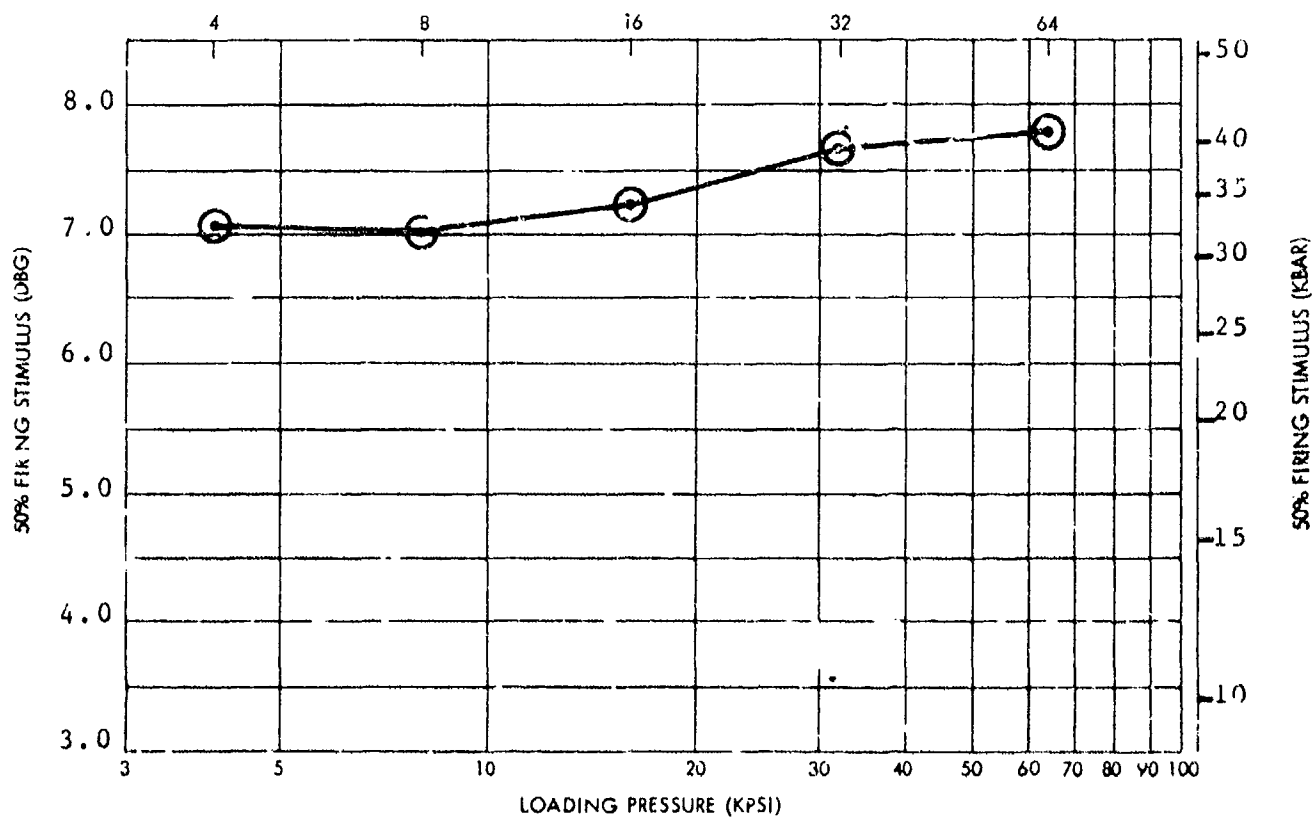
Remarks

\*Approximately 200 pounds,  
made in two 100-pound batches  
blended together; manufactured  
for NOL Corona. NOL-WO received  
1 pound for calibration.  
Specified Calcium Stearate  
content was 23.3%. Analysis  
for % Calcium Stearate was  
18.70  $\pm$  0.42.

NOLTR 73-132

|           |                       |           |     |              |
|-----------|-----------------------|-----------|-----|--------------|
| EXPLOSIVE | RDX/CA-ST (78.5/21.5) | x NO.     | 385 | Date of Test |
| TMD       | 1.561                 | I. D. NO. | -   | 4/62         |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DRG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                       | 1.449                         | 0.0028 | 92.9  | 7.071             | 0.0201 | 0.0187         | 20 |         |
| 8                       | 1.487                         | 0.0026 | 95.2  | 7.033             | 0.0818 | 0.0486         | 20 |         |
| 16                      | 1.506                         | 0.0024 | 96.5  | 7.243             | 0.0399 | 0.0271         | 20 |         |
| 32                      | 1.510                         | 0.0020 | 96.7  | 7.673             | 0.0218 | 0.0197         | 20 |         |
| 64                      | 1.516                         | 0.0029 | 97.1  | 7.797             | 0.0201 | 0.0144         | 20 |         |



SMALL SCALE GAP TEST (SOGT) DATA  
RDX/CA-ST (78.5/21.5)

G1dd1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (78.5/21.5)

X NO.: 385 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY:

BATCH NO.: 8-369-29

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (E or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

E = cm

S = log units

n =

Remarks

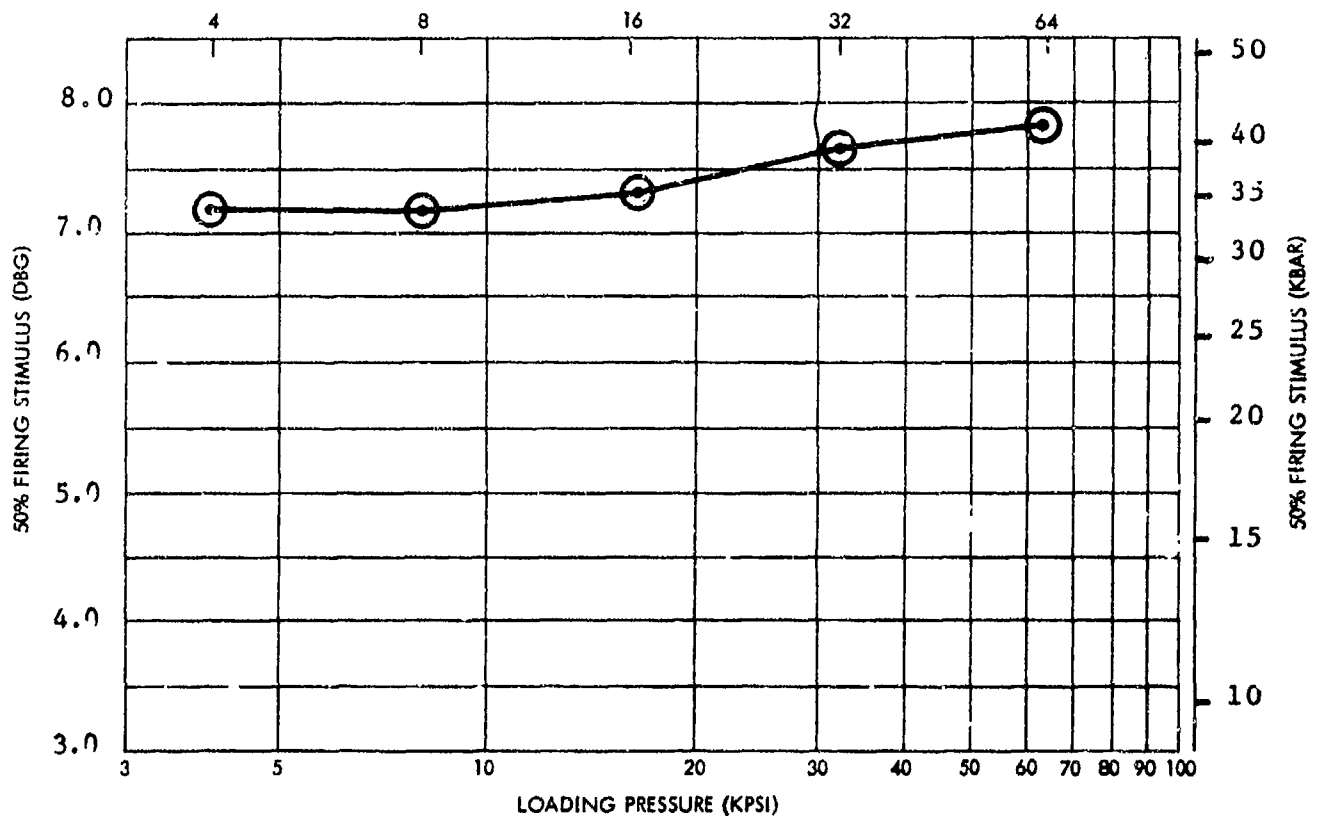
\*Approximately 100 pounds,  
manufactured for NOL Corona.  
NOL-WO received 1 pound for  
calibration. Specified  
Calcium Stearate content  
was 26.0%. Analysis %  
Calcium Stearate was  
21.49  $\pm$  0.47.

G 1 dd 2

4 Sep 1973

EXPLOSIVE RDX/CA-ST (76.2/23.8) X NO. 386 Date of Test  
 TMD 1.539 I. D. NO. - 4/62

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 4                       | 1.431                         | 0.0029 | 93.0  | 7.195             | 0.0189 | 0.0189         | 20 |         |
| 8                       | 1.466                         | 0.0020 | 95.3  | 7.175             | 0.0419 | 0.0253         | 20 |         |
| 16                      | 1.484                         | 0.0046 | 96.4  | 7.308             | 0.0727 | 0.0429         | 20 |         |
| 32                      | 1.488                         | 0.0024 | 96.7  | 7.653             | 0.0229 | 0.0160         | 20 |         |
| 64                      | 1.493                         | 0.0026 | 97.0  | 7.834             | 0.0347 | 0.0230         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
 RDX/CA-ST (76.2/23.8)

Gleel

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (76.2/23.8)

X NO.: 386 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: LOT NO.:

INITIAL QUANTITY: BATCH NO.: 8-369-29

MANUFACTURED BY:

Holston Ordnance Works  
Kingsport, Tenn.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

\*Approximately 100 pounds,  
manufactured for NOL Corona.  
NOL-WO received 1 pound for  
calibration. Specified  
Calcium Stearate content was  
28.0%. Analysis for %  
Calcium Stearate was  
23.75 ± 0.37.

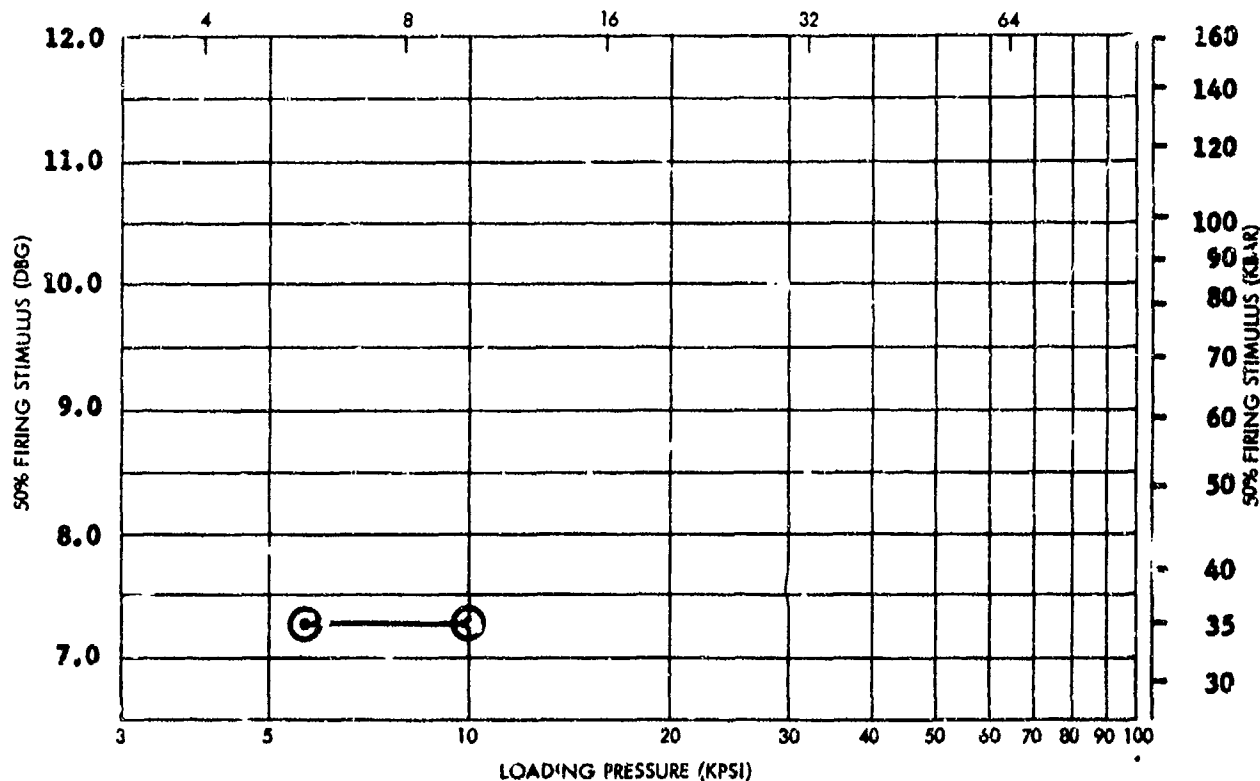


EXPLOSIVE RDX/CA-ST (74/26)  
TMD -

X NO. 291  
I. D. NO. -

Date of Test  
9/59

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |       | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|-------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s     |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 5.63                    | 1.465                         | .0041 | -     | 7.288             | 0.1474 | 0.0489         | 46 |         |
| 10                      | 1.479                         | .0156 | -     | 7.210             | 0.1314 | 0.0465         | 42 |         |
|                         |                               |       |       |                   |        |                |    |         |
|                         |                               |       |       |                   |        |                |    |         |
|                         |                               |       |       |                   |        |                |    |         |
|                         |                               |       |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/CA-ST (74/26)

Glff1

4 Sep 1973

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (74.0/26.0)

X NO.: 291 ID: Z NO.: 212 SSGT LOAD ORDER NO.:

SOURCE: See Note (1)

CHEMICAL NAME:

DATE RECEIVED: 8/26/58

LOT NO.:

INITIAL QUANTITY: 10 pounds

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: WE Division  
Bldg 318

§ = cm

s = log units

n =

Remarks

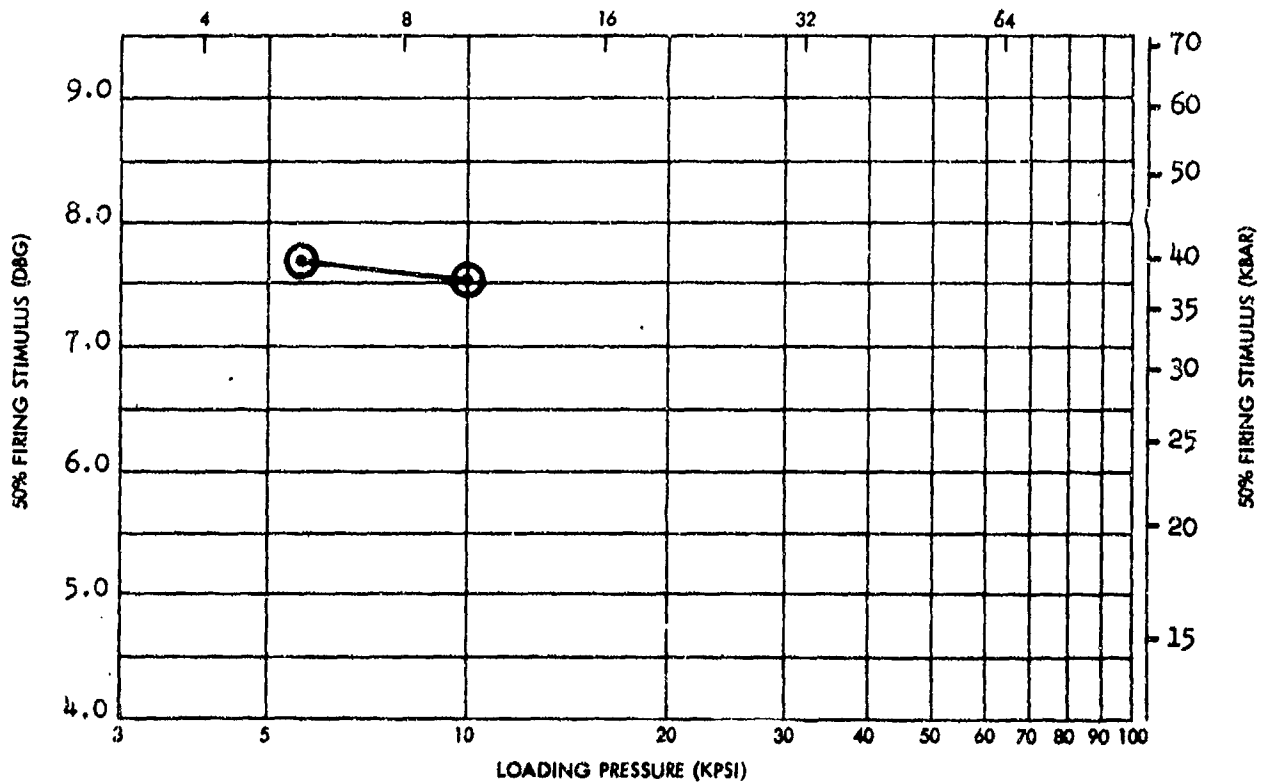
(1) RDX X NO. 189 "Chemical Precipitation Method. For additional information refer to sample preparation book Bldg 312\* (sic) pg. 78."

\*Probably it should be Bldg 318, not Bldg 312.

EXPLOSIVE **RDX/CA-ST, (71.2/28.8)** X NO. **219** Date of Test **9/59**  
 TMD **-** I. D. NO. **-**

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (D&G) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 5.7                     | 1.427                         | 0.0081 | -     | 7.677             | 0.0706 | 0.0271         | 46 | (1)     |
| 10.0                    | 1.448                         | 0.0105 | -     | 7.519             | 0.1582 | 0.0647         | 48 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |

(1) Date of test - 9/60



SMALL SCALE GAP TEST (SSGT) DATA  
**RDX/CA-ST, (71.2/28.8)**

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Calcium Stearate (71.2/28.8)

X NO.: 219      ID:              Z NO.: 279      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 10/15/55

LOT NO.:

INITIAL QUANTITY: 5 kilograms

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 500 point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: EP Division

x =      cm

s =      log units

n =

Remarks

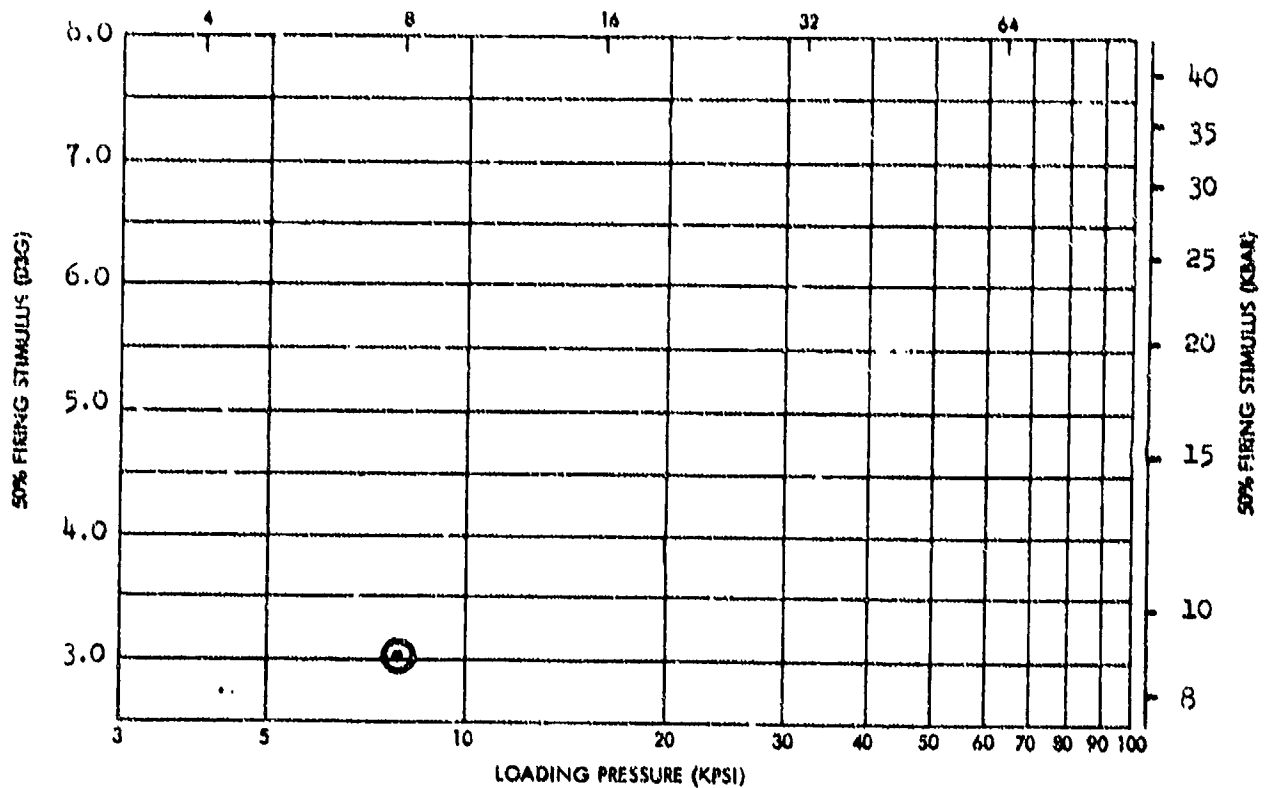
NOLTR 73-132

EXPLOSIVE PEIN/DATB (75/25)  
TMD

X NO. 507  
I. O. NO.

Date of Test  
1/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DGG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | g      |       | AVG.              | g      | g <sub>m</sub> | N  |         |
| 8                             | 1.450                            | 0.0076 | -     | 3.011             | 0.0148 | 0.0132         | 20 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA

PEIN/DATB (75/25)

G2a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PETN/DATB (75/25)\*

X NO.: 507      ID:      Z NO.: 609      SSGT LOAD ORDER NO.: 1009

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 12/8/64

LOT NO.:

INITIAL QUANTITY: 200 grams

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 500 point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: WE Division  
Bldg 335

g =      cm

s =      log units

n =

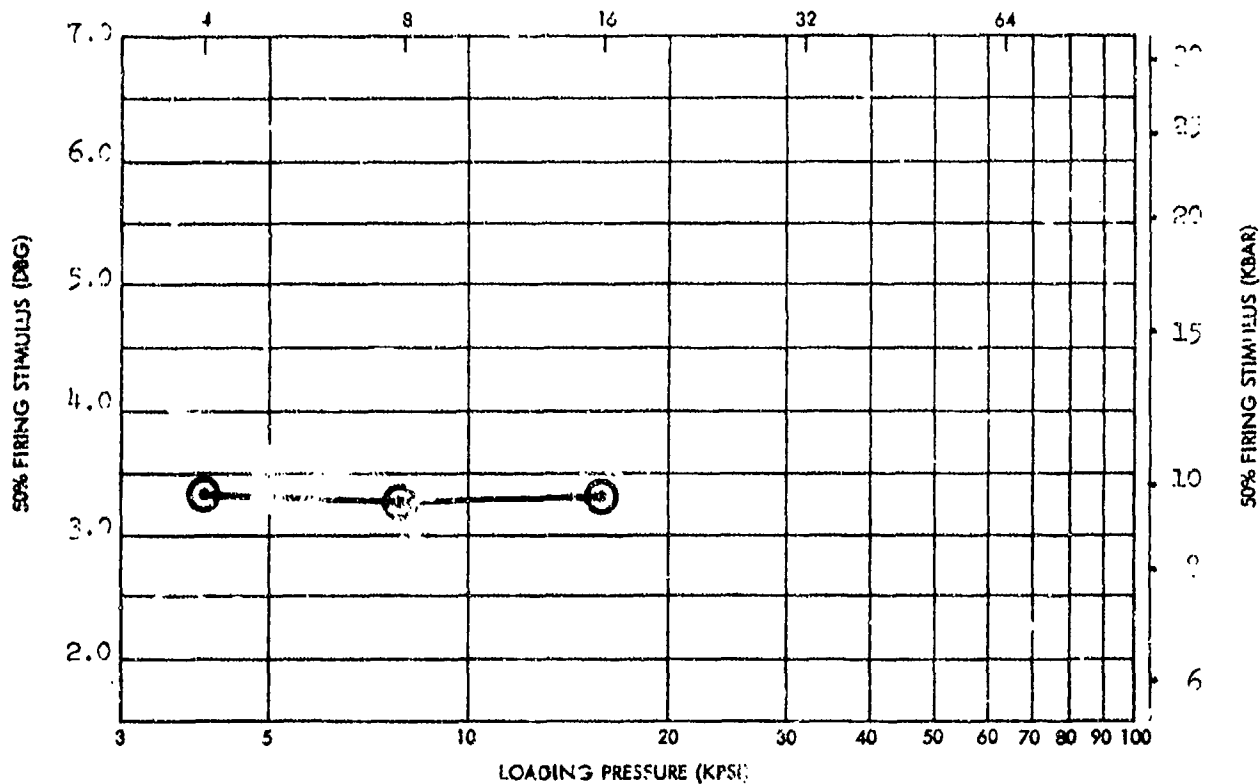
Remarks

\*Used PETN (X321) and DATB  
(X331); see Data Packs  
B4b and Die. Materials  
dried overnight @ 50°C  
and then dry blended for  
1 hour.

EXPLOSIVE PETN/DATE (50/50) X NO. 505  
TMD - I. D. NO. -

Date of Test  
12/64

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.514                            | 2.0075 | -     | 2.530             | 0.0223 | 0.0254         | 20 |         |
| 8                             | 1.412                            | 2.0076 | -     | 2.530             | 0.0420 | 0.0222         | 20 |         |
| 16                            | 1.527                            | 2.0045 | -     | 2.504             | 0.0341 | 0.0250         | 20 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
PETN/DATE (50/50)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PETN/DATB (50/50)\*

X NO.: 505 ID: Z NO.: 607 SSGT LOAD ORDER NO.: 999

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 12/8/64

LOT NO.:

INITIAL QUANTITY: 200 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 335

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

s = cm

s = log units

n =

Remarks

\*Used PETN (X321) and DATB  
(X331); see Data Packs  
B4b and D1e. Materials  
dried overnight @ 50°C and  
then dry blended for  
1 hour.

G 2 b 2

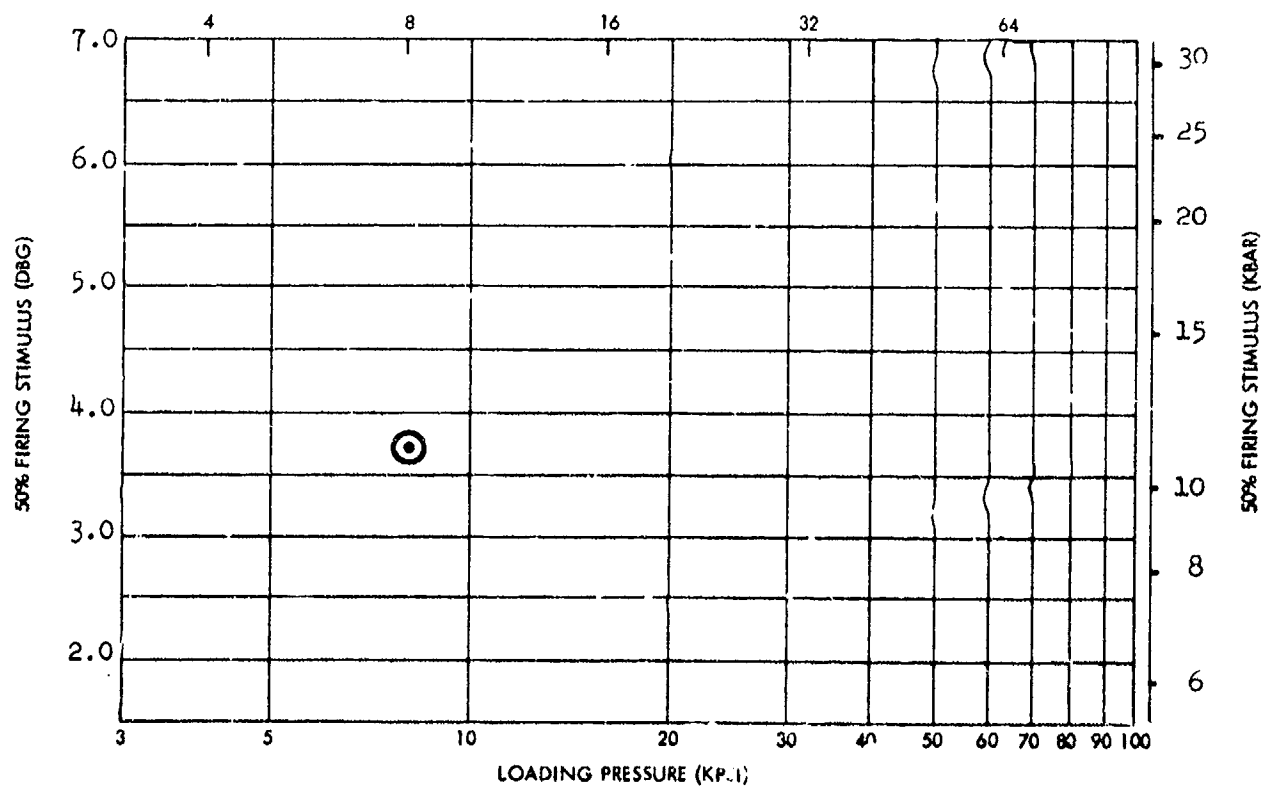
4 Sep 1973



|           |                   |           |     |
|-----------|-------------------|-----------|-----|
| EXPLOSIVE | PETN/DATB (25/75) | X NO.     | 506 |
| TMD       | -                 | I. D. NO. | -   |

Date of Test  
12/64

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                             | 1.378                            | 0.0059 | -     | 3.745             | 0.0036 | 0.0026         | 19 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
PETN/DATB (25/75)

G2c1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PETN/DATB (25/75)\*

X NO.: 506 ID: Z NO.: 608 SSGT LOAD ORDER NO.: 1000

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 12/8/64

LOT NO.:

INITIAL QUANTITY: 200 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 335

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

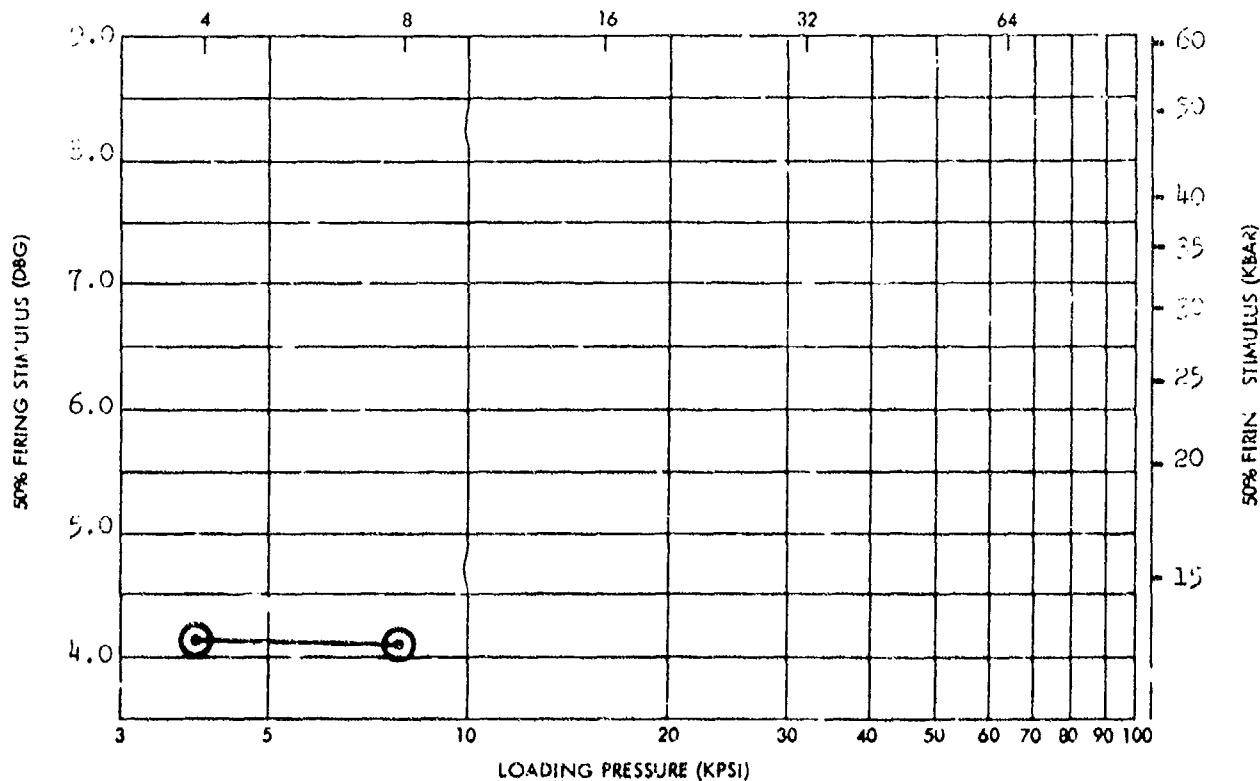
\*Used PETN (X321) and DATB  
(X331); see Data Packs  
B4b and Dle. Materials  
dried overnight @ 50°C and  
then dry blended for  
1 hour.

|           |                   |           |     |
|-----------|-------------------|-----------|-----|
| EXPLOSIVE | PETN/DATB (15/35) | X NO.     | 555 |
| TMD       | -                 | I. D. NO. | -   |

Date of Test  
1/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.255                            | 0.0062 | -     | 4.135             | 0.0075 | 0.0082         | 21 |         |
| 8                             | 1.362                            | 0.0037 | -     | 4.118             | -      | -              | 21 | (1)     |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |

(1) No mixed response zone



SMALL SCALE GAP TEST (SSGT) DATA  
PETN/DATB (15/35)

G2d1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PETN/DATB (15/85)\*

X NO.: 555 ID:                      Z NO.:                      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 3/66

LOT NO.:

INITIAL QUANTITY: 200 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WL Division  
Bldg 335

IMPACT SENSITIVITY (\$ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

\$ =              cm

s =              log units

n =

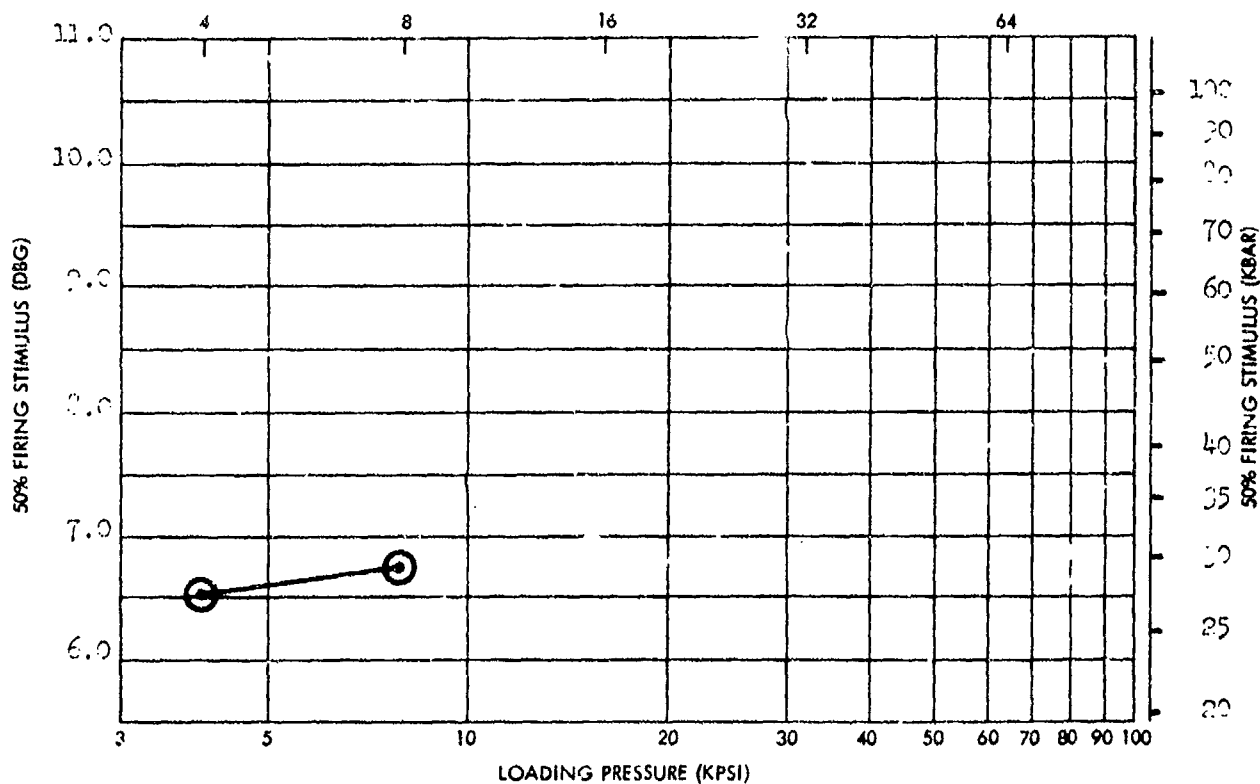
Remarks

Used PETN (X321) and DATB  
(X331); see Data Packs  
B4b and D1e. Materials  
dried overnight @ 50°C  
and then dry blended for  
1 hour.

|           |                  |           |     |
|-----------|------------------|-----------|-----|
| EXPLOSIVE | PETN/DATB (5/75) | X NO.     | 526 |
| TMD       | -                | I. D. NO. | -   |

Date of Test  
1/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM./CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|-----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                              | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 4                             | 1.240                             | 0.0250 | -     | 6.531             | 0.0254 | 0.0001         | 23 |         |
| 6                             | 1.140                             | 0.0045 | -     | 6.750             | 0.0211 | 0.0155         | 23 |         |
|                               |                                   |        |       |                   |        |                |    |         |
|                               |                                   |        |       |                   |        |                |    |         |
|                               |                                   |        |       |                   |        |                |    |         |
|                               |                                   |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
PETN/DATB (5/75)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PETN/DATB (5/95)\*

X NO.: 556 ID: Z NO.: SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 3/66

LOT NO.:

INITIAL QUANTITY: 200 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 335

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ = cm

s = log units

n =

Remarks

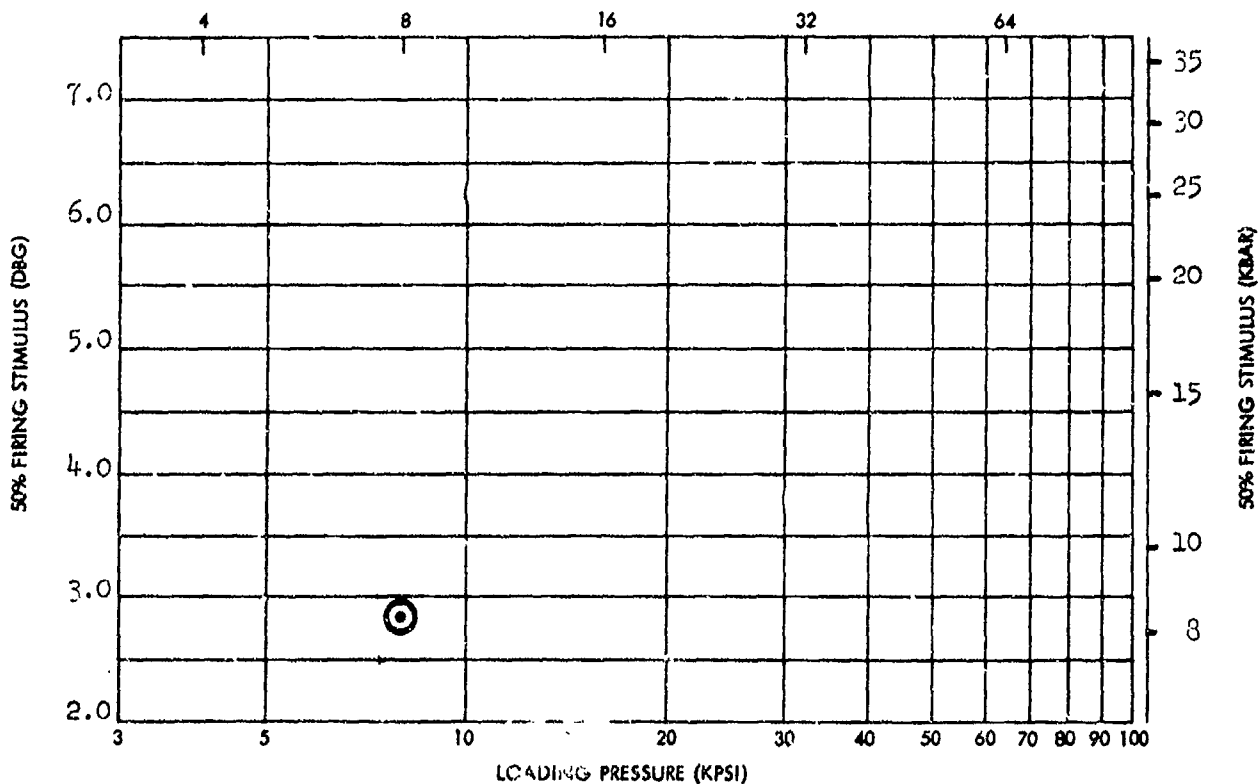
\*Used PETN (X321) and DATB (X331); see Data Packs B4b and D1e. Materials dried overnight @ 50°C and then dry blended for 1 hour.

NOLTR 73-132

|           |                   |           |     |
|-----------|-------------------|-----------|-----|
| EXPLOSIVE | PETN/TATB (50/50) | X NO.     | 508 |
| TMD       | -                 | I. D. NO. | -   |

Date of Test  
1/65

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 3                       | 1.601                         | 0.0040 | -     | 2.848             | 0.0376 | 0.0490         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
PETN/TATB (50/50)

G3a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: PETN/TATB (50/50)\*

X NO.: 508      ID:      Z NO.:      SSGT LOAD ORDER NO.: 1010

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 12/8/64

LOT NO.:

INITIAL QUANTITY: 200 grams

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 335

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ =      cm

s =      log units

n =

Remarks

\*Used PETN (X321) and TATB (X406); see Data Packs B4b and D2b. Materials dried overnight at 50°C and then dry blended for 1 hour.

G 3 a 2

4 Sep 1973



EXPLOSIVE DATE/TATP (50/50)

X NO.

509

Date of Test

TMD

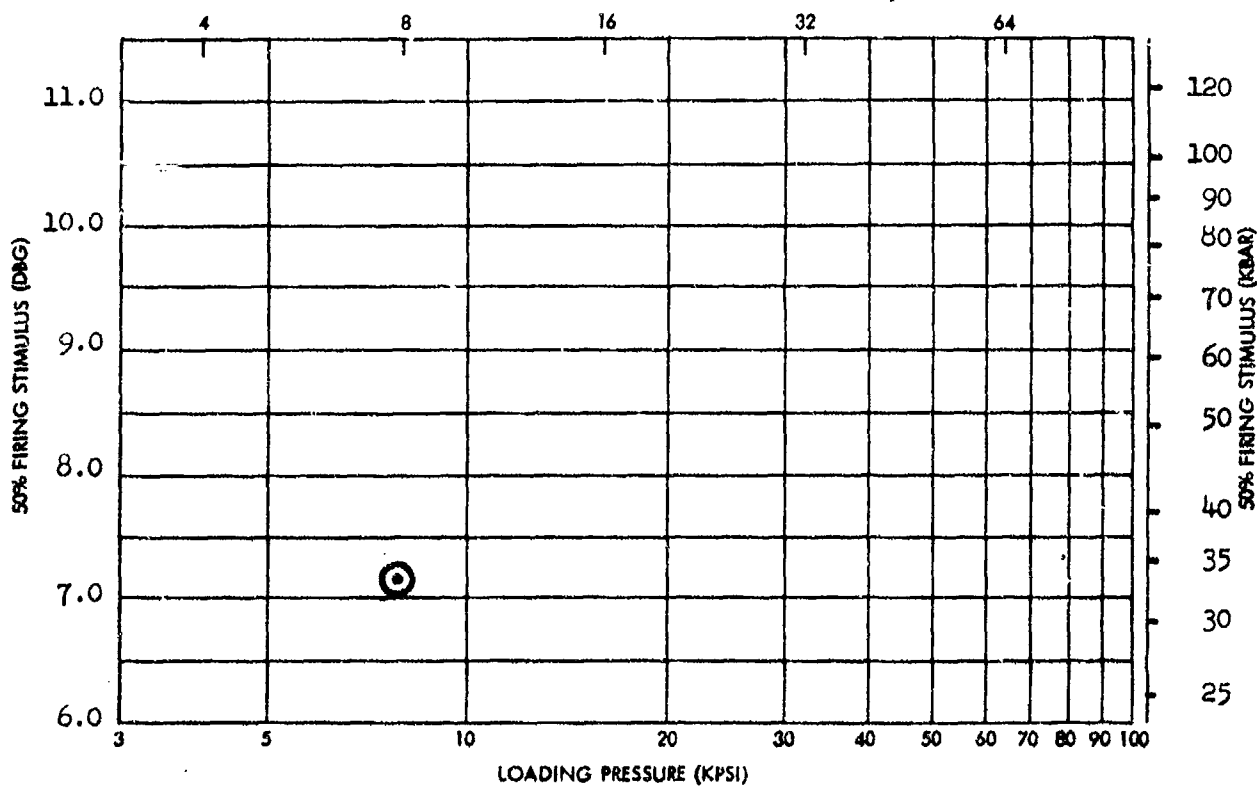
-

I. D. NO.

-

1/65

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                             | 1.522                            | 0.0100 | -     | 7.142             | 0.0216 | 0.0186         | 20 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA

DATE/TATP (50/50)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATB/TATB (50/50)\*

X NO.: 509      ID:      Z NO.: 611      SSGT LOAD ORDER NO.: 1011

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 12/8/64

LOT NO.:

INITIAL QUANTITY:

BATCH NO.:

MANUFACTURED BY:

NOL: WE Division  
Bldg 335

IMPACT SENSITIVITY (3 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

s =      cm

s =      log units

n =

Remarks

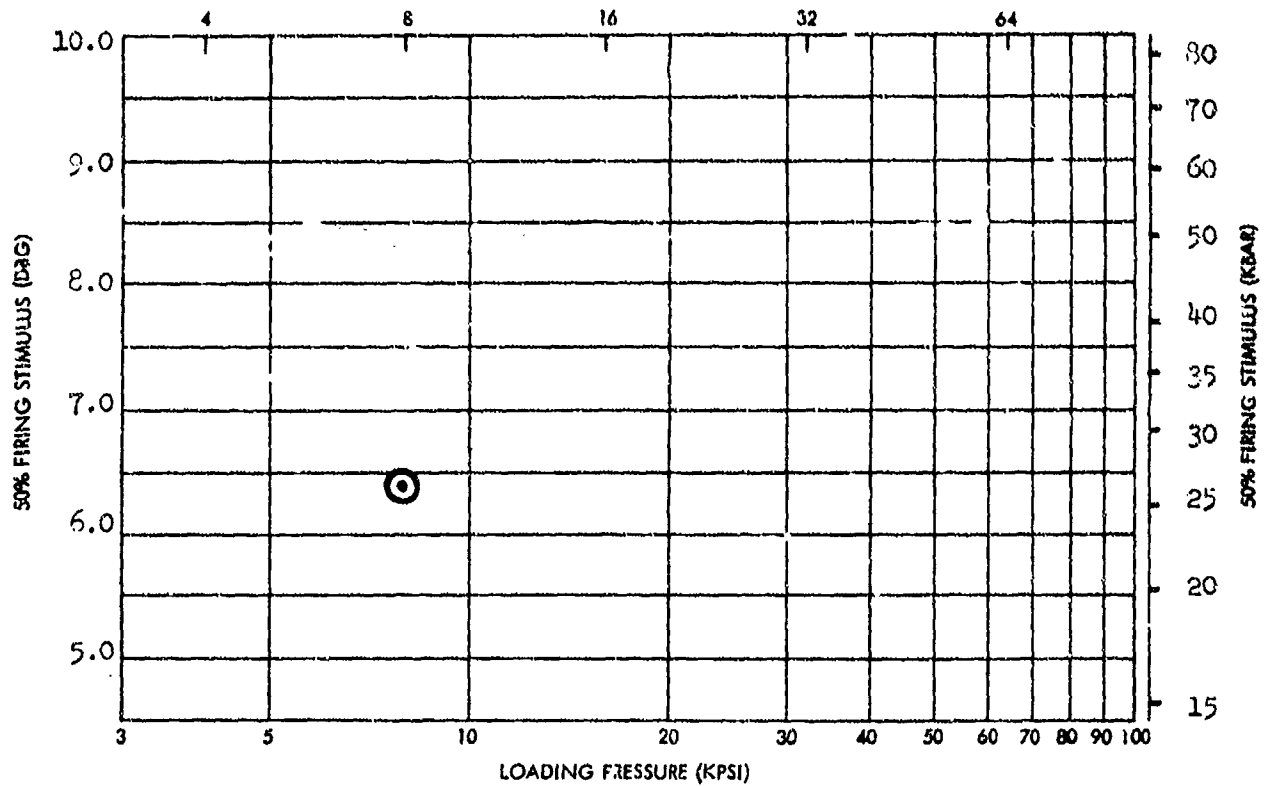
\*Used DATB (X331) and TATB  
(X406); see Data Packs  
D1e and D2b. Materials  
dried overnight @ 50°C  
and then dry blended for  
1 hour.

NO. 73-132

EXPLOSIVE DATE/HNS-II (75/25) X NO. 369  
TMD I. D. NO.

Date of Test  
6/66

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DB) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|------------------|--------|----------------|----|---------|
|                               | AVG.                             | S      |       | AVG.             | S      | S <sub>m</sub> | N  |         |
| 8                             | 1.374                            | 0.0089 | -     | 6.393            | 0.0193 | 0.0144         | 23 |         |
|                               |                                  |        |       |                  |        |                |    |         |
|                               |                                  |        |       |                  |        |                |    |         |
|                               |                                  |        |       |                  |        |                |    |         |
|                               |                                  |        |       |                  |        |                |    |         |
|                               |                                  |        |       |                  |        |                |    |         |
|                               |                                  |        |       |                  |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
DATE/HNS-II (75/25)

G5a1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATB/HNS-II (75/25)\*

X NO.: 569      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 6/8/66

LOT NO.:

INITIAL QUANTITY: 100 grams

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (# or 50% point)

(Type 12 Tools; 2.5 Kg wt; Sandpaper)

NOL: WE Division

DATE OF TEST

# = cm

s = log units

n =

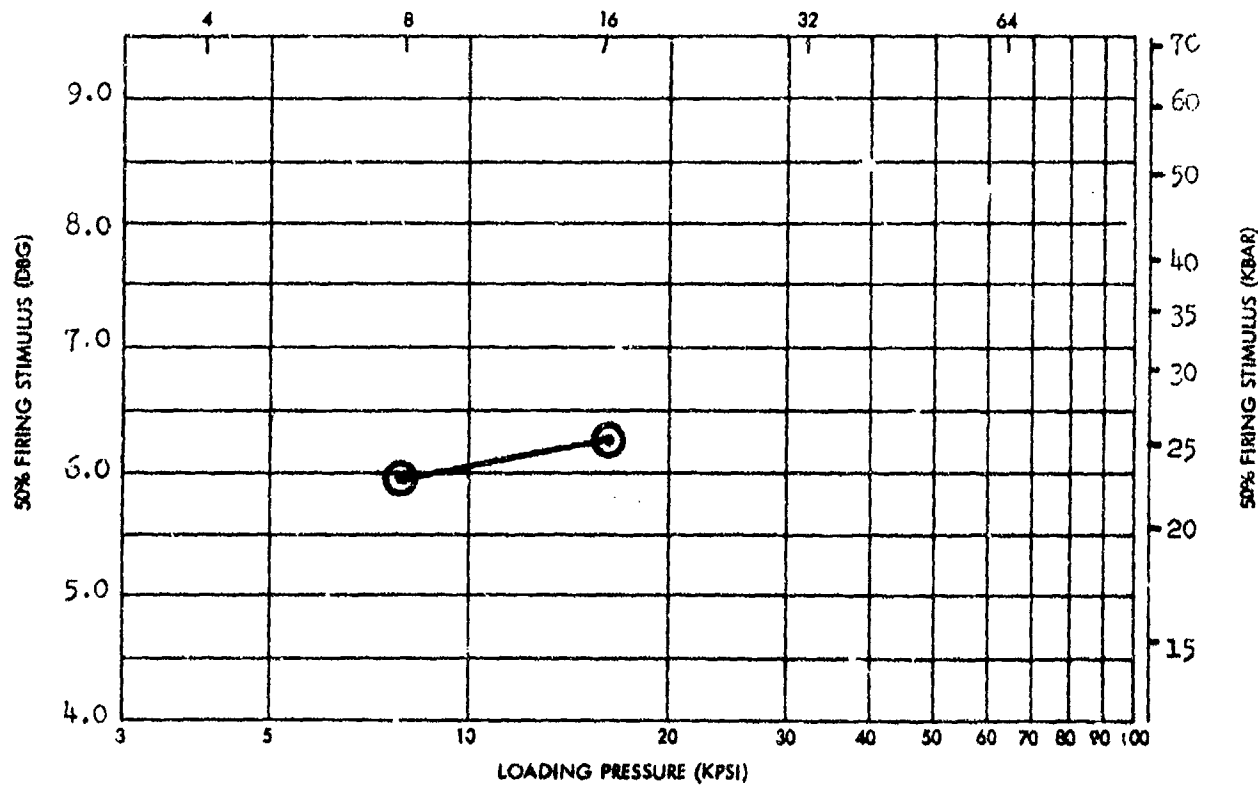
Remarks

\*Used DATB (X331) and HNS-II (X550); see Data Packs D1e and D8d. Materials dry-blended for 2 hours.

EXPLOSIVE DATB/HNS-II (50/50) X NO. 566  
YMD - I. D. NO. -

Date of Test  
5/66

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                             | 1.401                            | 0.0093 | -     | 5.948             | 0.0344 | 0.0266         | 20 |         |
| 16                            | 1.540                            | 0.0050 | -     | 6.254             | 0.0106 | 0.0096         | 20 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
DATB/HNS-II (50/50)

G5b1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: DATB/HNS-II (50/50)\*

X NO.: 566      ID:      Z NO.:      SSGT LOAD ORDER NO.:

SOURCE:

CHEMICAL NAME:

DATE RECEIVED: 5/18/66

LOT NO.:

INITIAL QUANTITY: 200 grams

BATCH NO.:

MANUFACTURED BY:

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

NOL: WE Division

§ =      cm

s =      log units

n =

Remarks

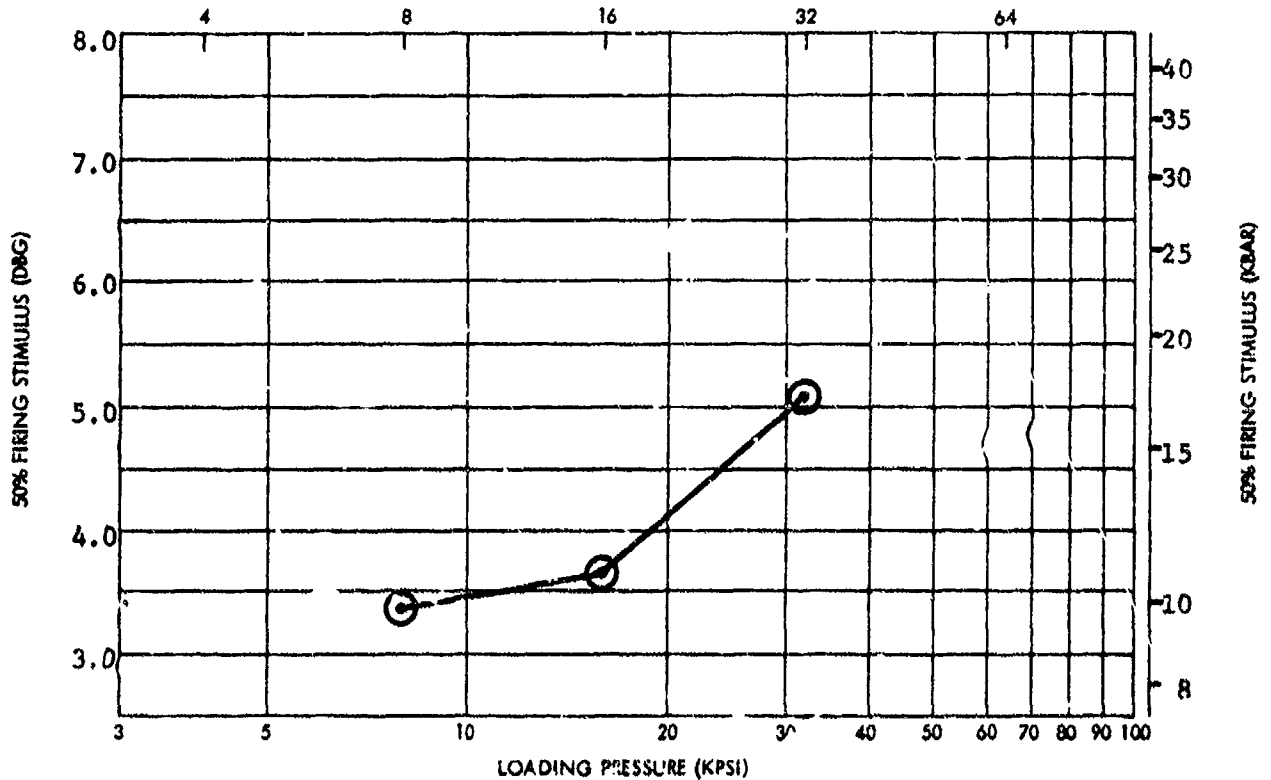
\*Used DATB (X331) and HNS-II  
(X550); see Data Packs D1e  
and D8d. Materials dry-  
blended for 2 hours.

EXPLOSIVE RDx/ST-AC (99.7/0.3)  
TMD 1.797

X NO. 822  
I. D. NO. 1670

Date of Test  
11/72

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.570                         | 0.0081 | 87.4  | 3.340             | 0.0217 | 0.0211         | 20 |         |
| 16                      | 1.652                         | 0.0099 | 91.9  | 3.641             | 0.1200 | 0.0634         | 20 |         |
| 32                      | 1.734                         | 0.0045 | 96.5  | 5.095             | 0.1406 | 0.0686         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDx/ST-AC (99.7/0.3)

## CHEMICAL DATA

15

0.125"

4 Sep 1973



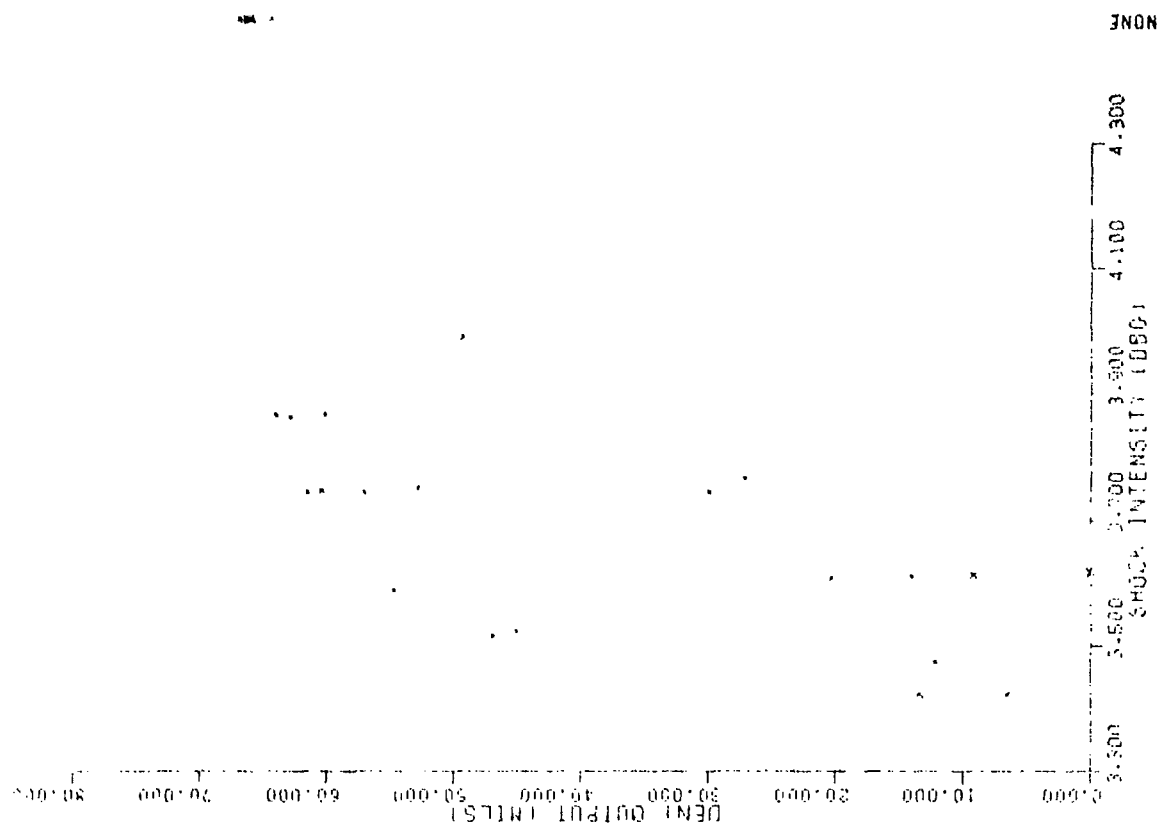
NOLTR 73-132

THIS PAGE INTENTIONALLY LEFT BLANK

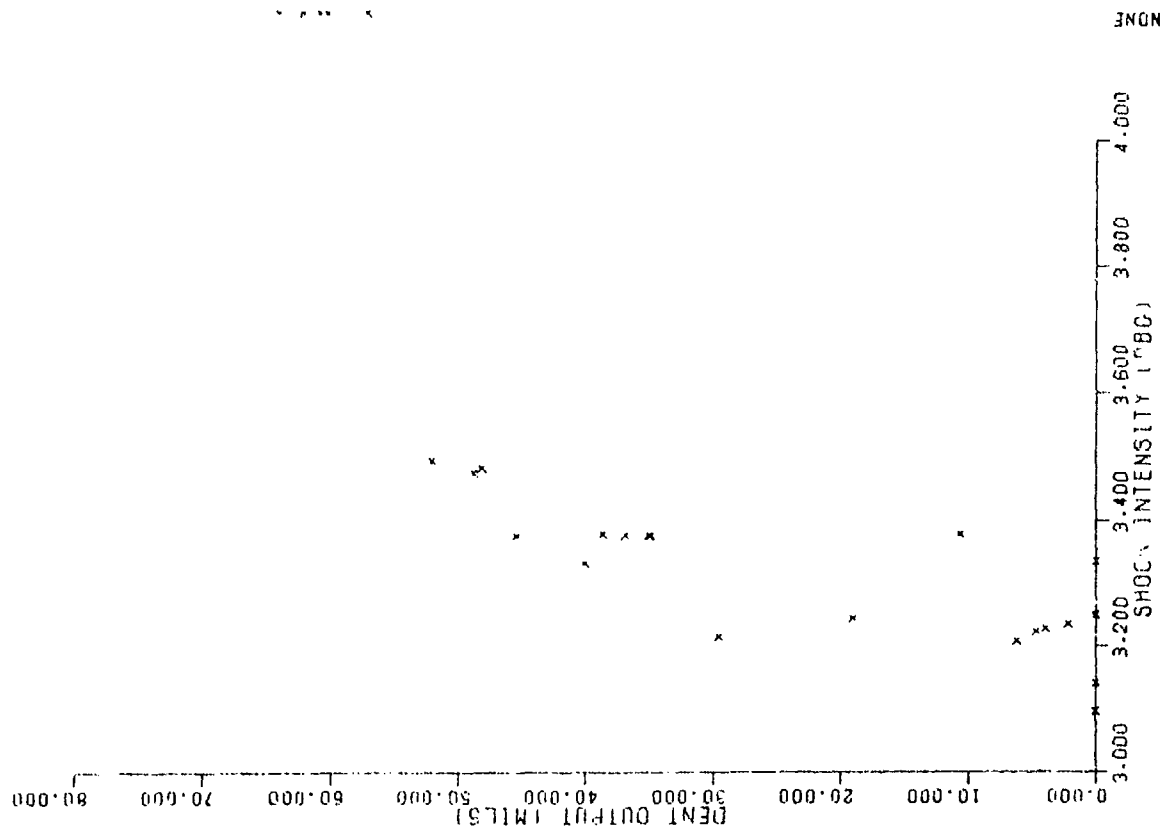
G6a3/G6a4

NOLTR 73-132

PDX STEARIC ACID (X 822, ID 1470) 16 KPSI  
(99.7% 0.3)



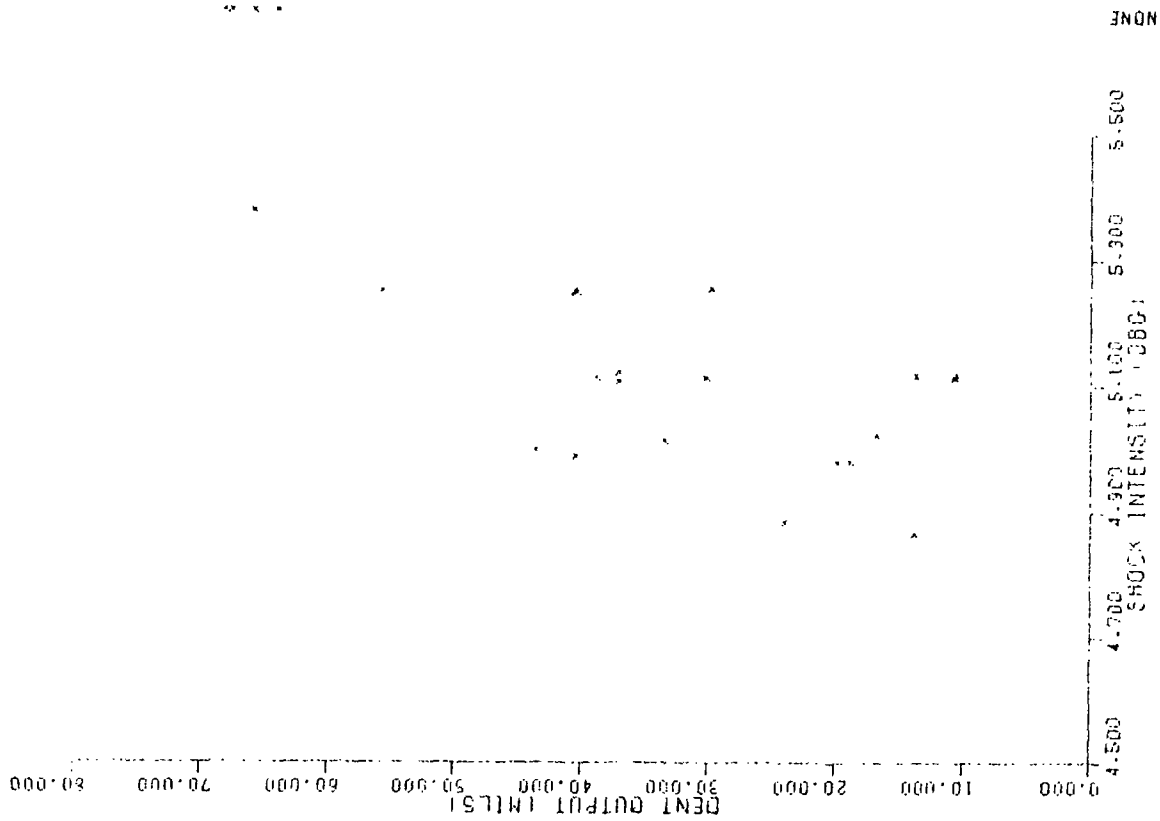
RDX STEARIC ACID (X 822, ID 1670) 6 KPSI  
(99.7% 0.3)



G6a5

NOLTR 73-132

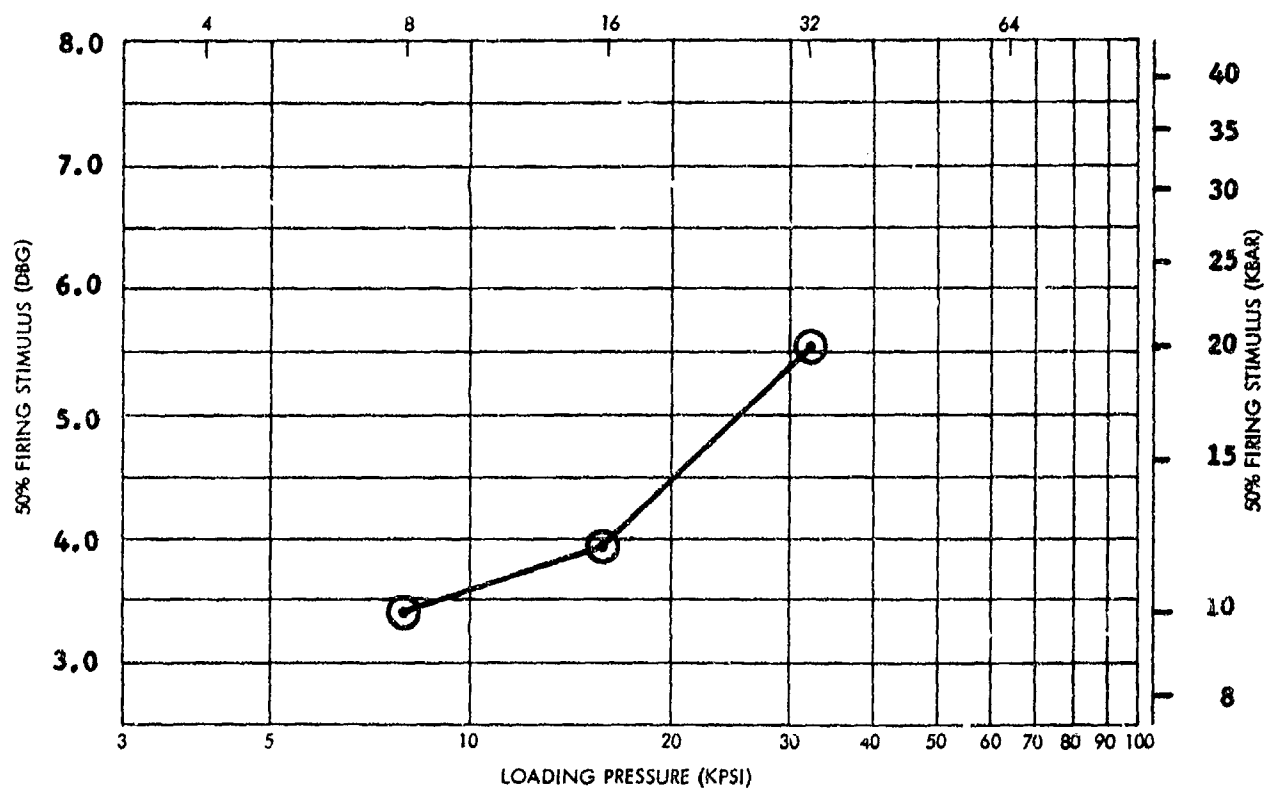
RDX/STEARIC ACID (X 822, ID 1670) 32 KPSI  
(99.7/0.3)



G6a6

|           |                      |           |      |              |       |
|-----------|----------------------|-----------|------|--------------|-------|
| EXPLOSIVE | RDX/ST-AC (99.4/0.6) | X NO.     | 823  | Date of Test | 11/72 |
| TMD       | 1.792                | I. D. NO. | 1671 |              |       |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.605                         | 0.0025 | 89.5  | 3.398             | 0.0503 | 0.0291         | 20 |         |
| 16                      | 1.673                         | 0.0035 | 93.3  | 3.939             | 0.0253 | 0.0214         | 20 |         |
| 32                      | 1.738                         | 0.0023 | 97.0  | 5.522             | 0.1076 | 0.0556         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/ST-AC (99.4/0.6)

G6b1

4 Sep 1973

NOLTR 73-132  
CHEMICAL DATA

EXPLOSIVE NAME: RDX/Stearic Acid (99.4/0.6)

X NO.: 823 ID: 1671 Z NO.: SSGT LOAD ORDER NO.: 1381

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY: 2 pounds

BATCH NO.: 2, SMUPA-1B, 8616-2

MANUFACTURED BY:

Picatinny Arsenal  
Dover, N. J.

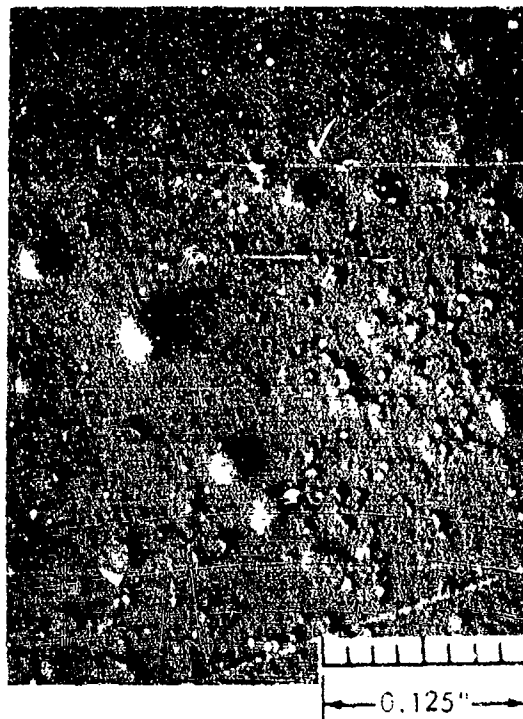
IMPACT SENSITIVITY (% or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks

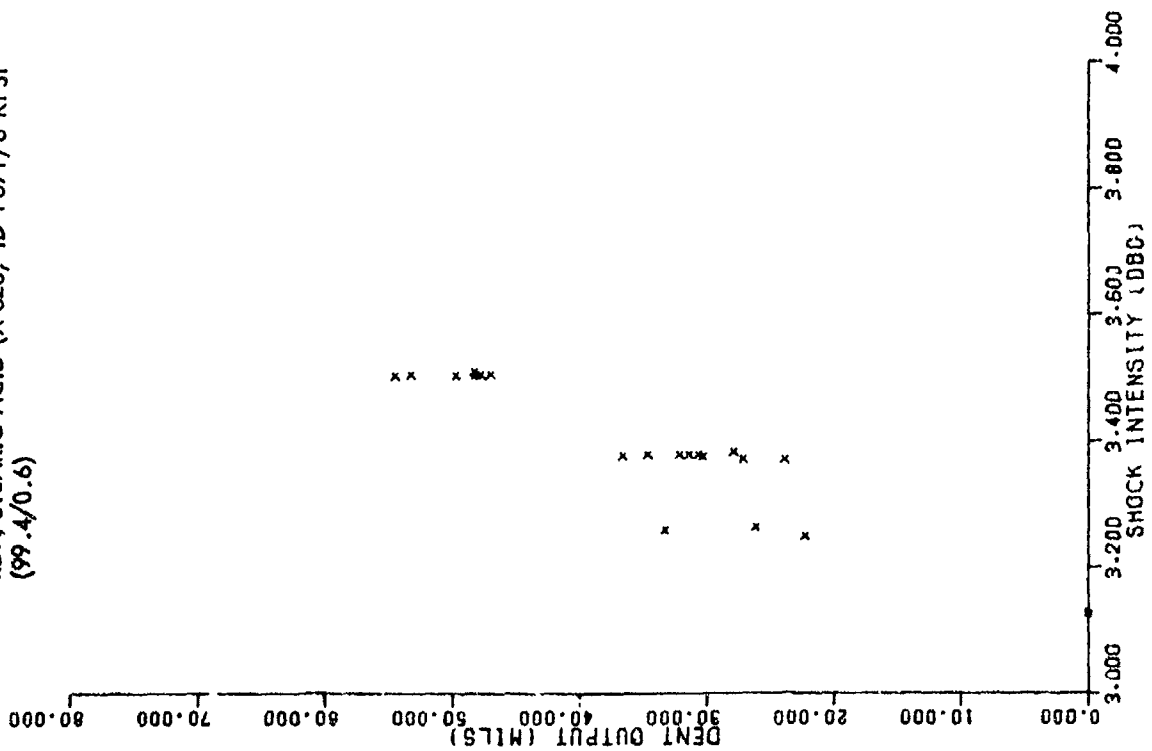


NOLTR 73-132

THIS PAGE INTENTIONALLY LEFT BLANK

G6b3/G6b4

RDX/STEARIC ACID (X 823, ID 1671) 8 KPSI  
(99.4/0.6)



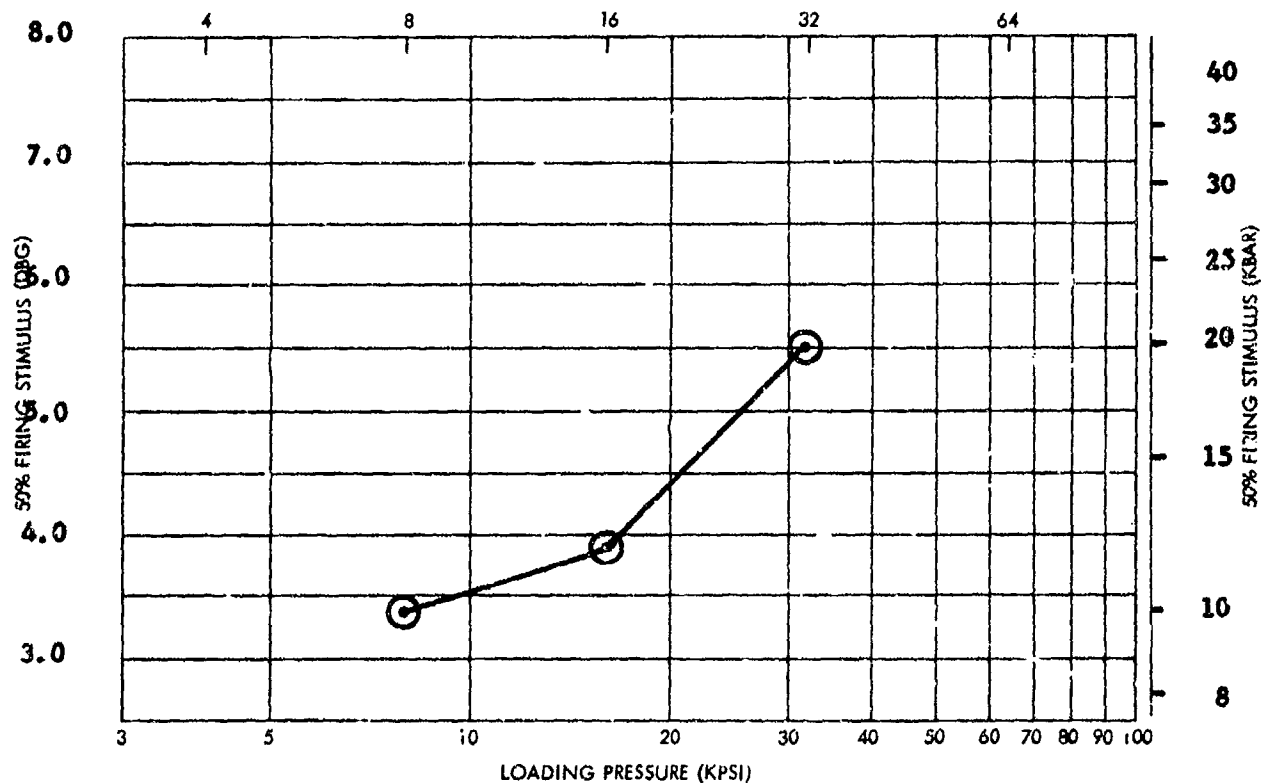
•





|           |                      |           |      |              |       |
|-----------|----------------------|-----------|------|--------------|-------|
| EXPLOSIVE | RDX/ST-AC (99.2/0.8) | X NO.     | 824  | Date of Test | 11/72 |
| TMD       | 1.789                | I. D. NO. | 1672 |              |       |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.579                         | 0.0064 | 88.3  | 3.369             | 0.0204 | 0.0148         | 20 |         |
| 16                      | 1.649                         | 0.0050 | 92.2  | 3.901             | 0.0723 | 0.0405         | 20 |         |
| 32                      | 1.729                         | 0.0044 | 96.6  | 5.505             | 0.0333 | 0.0230         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/ST-AC (99.2/0.8)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Stearic Acid (99.2/0.8)

X NO.: 824      ID: 1672      Z NO.:      SSGT LOAD ORDER NO.: 1379,  
1381

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY: 2 pounds

BATCH NO.: 3, SMUPA-IB, 8616-3

MANUFACTURED BY:

Picatinny Arsenal  
Dover, N. J.

IMPACT SENSITIVITY (§ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

§ =      cm

s =      log units

n =

Remarks



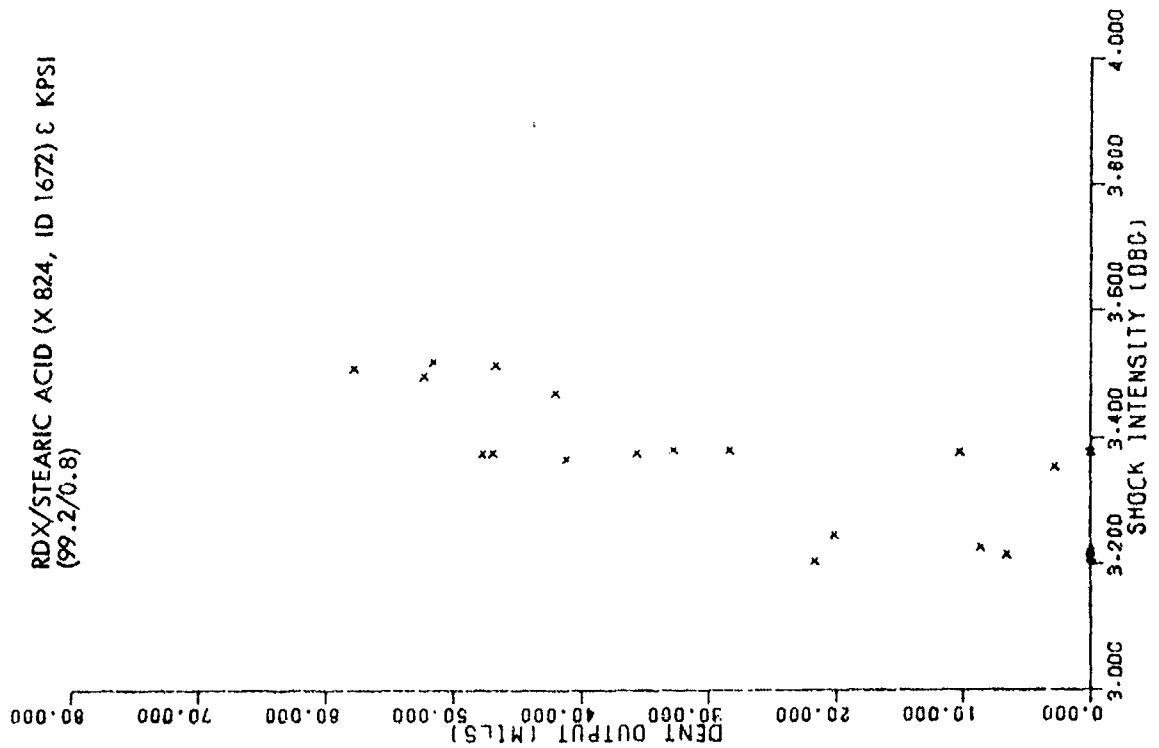
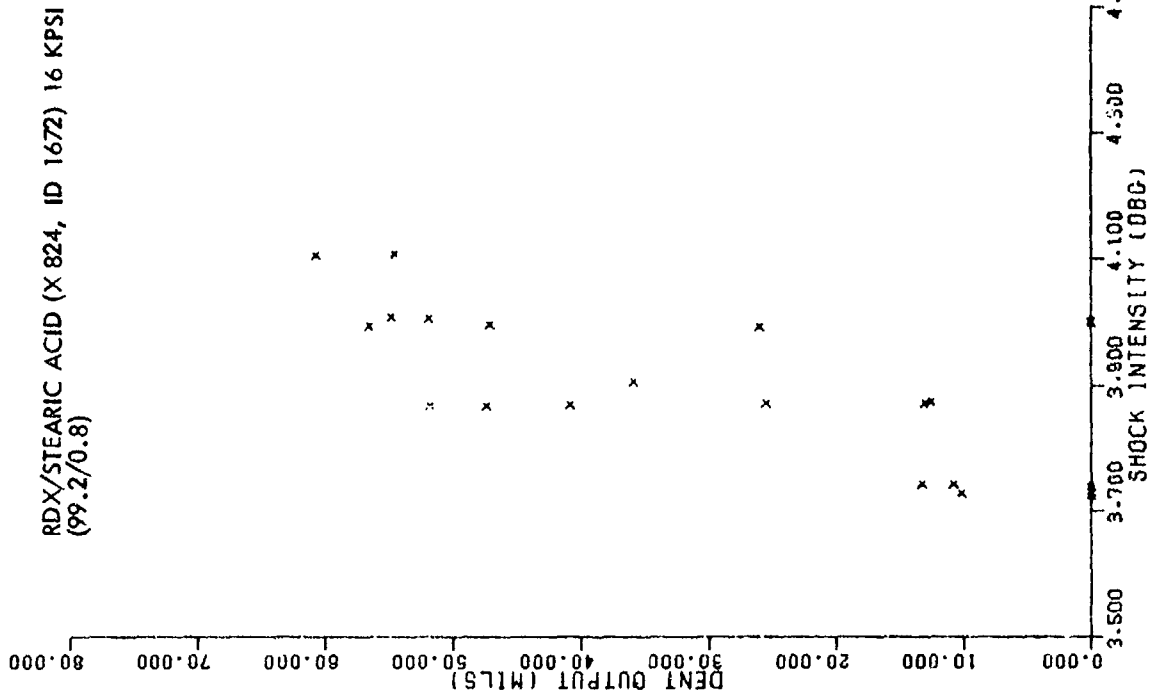
G 6 c 2

4 Sep 1973

NOLTR 73-132

THIS PAGE INTENTIONALLY LEFT BLANK

G6c3/G6c4

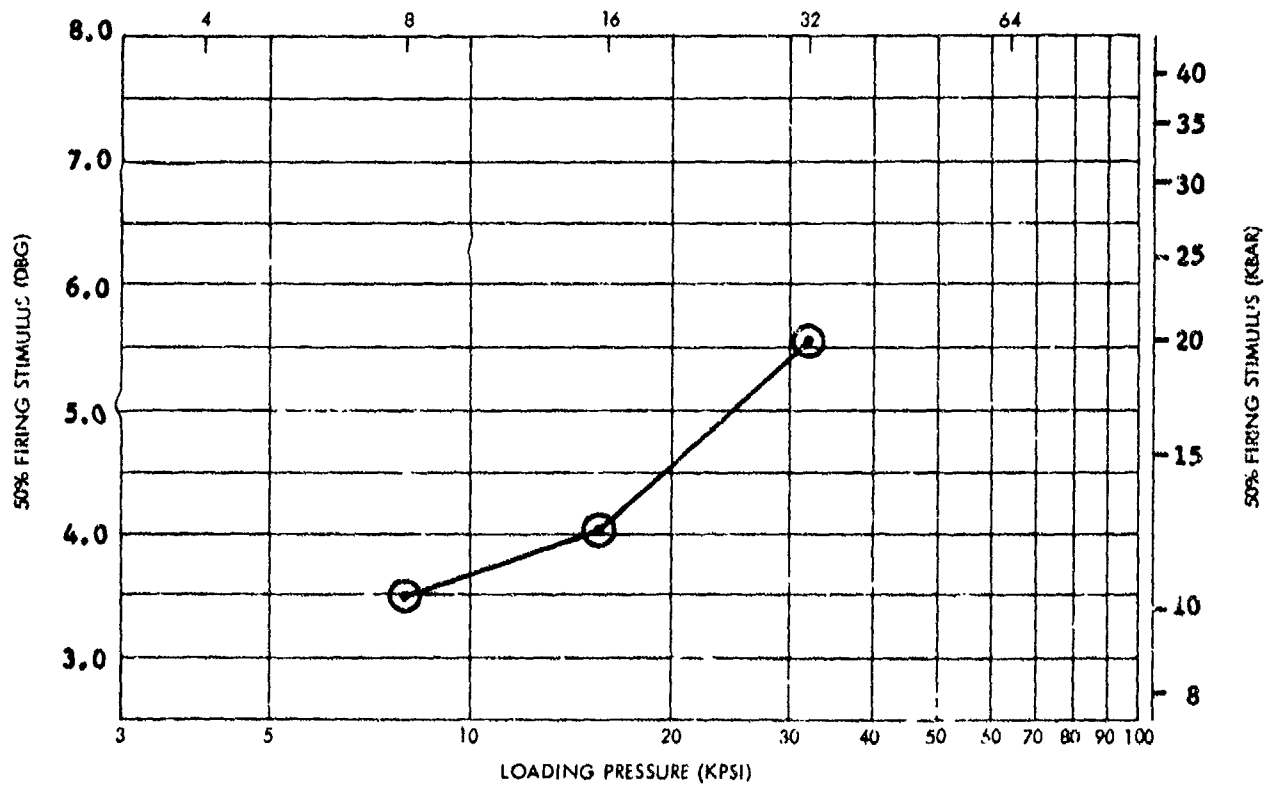




|           |                      |           |      |
|-----------|----------------------|-----------|------|
| EXPLOSIVE | RDX/ST-AC (98.8/1.2) | X NO.     | 825  |
| TMD       | 1.782                | I. D. NO. | 1673 |

Date of Test  
11/72

| LOADING<br>PRESSURE<br>(KPSI) | DENSITY<br>(GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------------|----------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                               | AVG.                             | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                             | 1.599                            | 0.0016 | 89.7  | 3.476             | 0.0181 | 0.0289         | 20 |         |
| 16                            | 1.664                            | 0.0123 | 93.4  | 4.016             | 0.0185 | 0.0199         | 20 |         |
| 32                            | 1.731                            | 0.0042 | 97.1  | 5.557             | 0.0663 | 0.0375         | 20 |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |
|                               |                                  |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/ST-AC (98.8/1.2)

G6d1

4 Sep 1973

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Stearic Acid (98.8/1.2)

X NO.: 825      ID: 1673      Z NO.:      SSGT LOAD ORDER NO.: 1381

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY: 2 pounds

BATCH NO.: 4, SMUPA-1B, 8616-4

MANUFACTURED BY:

Picatinny Arsenal  
Dover, N. J.

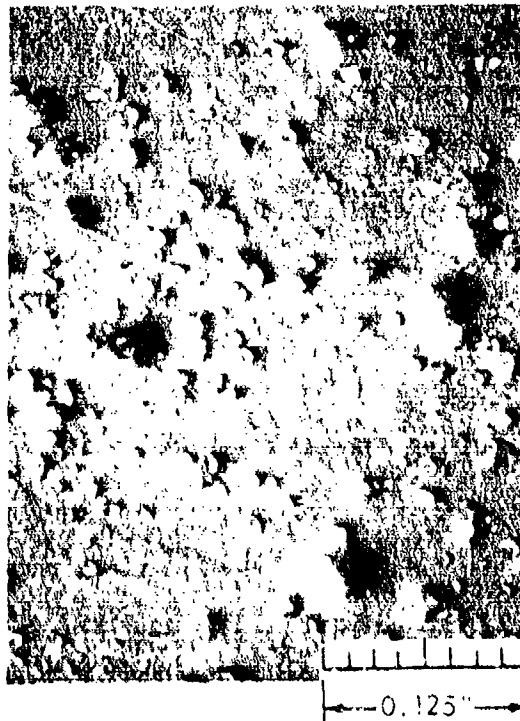
IMPACT SENSITIVITY (5 or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

g = cm

s = log units

n =

Remarks



G 6 d 2

4 Sep 1973

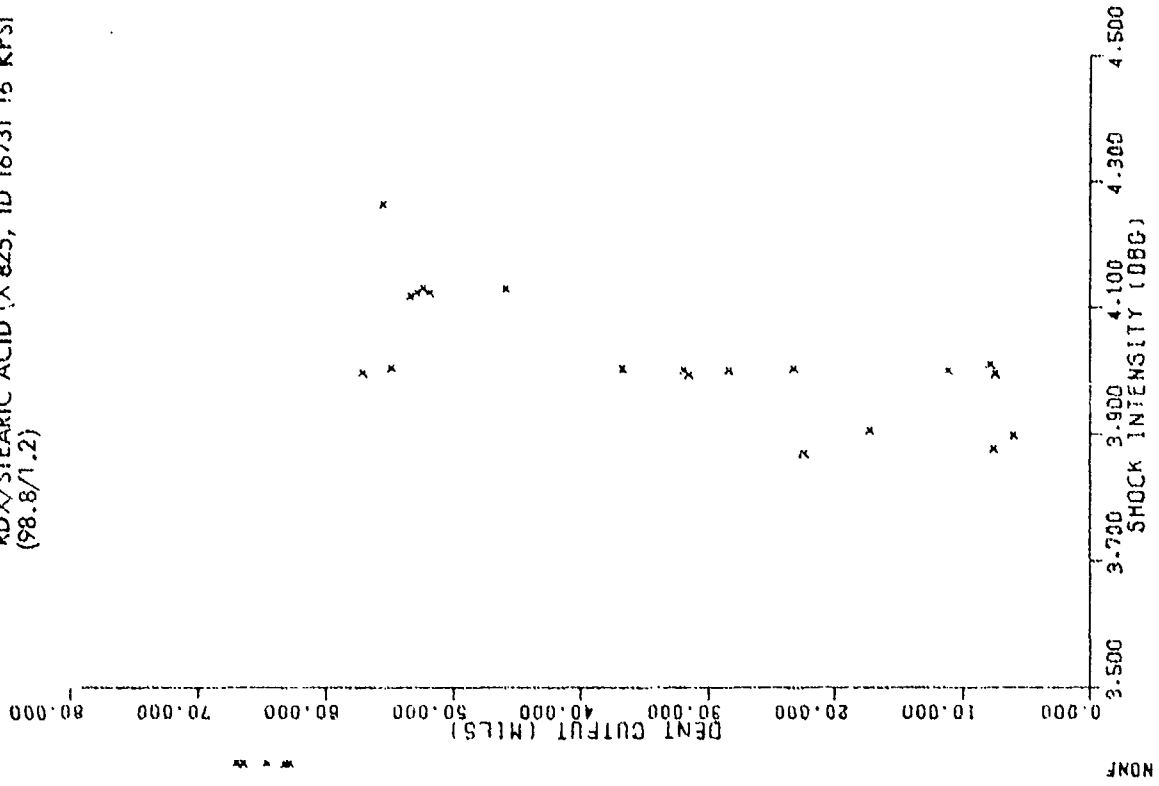
NOLTR 73-132

THIS PAGE INTENTIONALLY LEFT BLANK

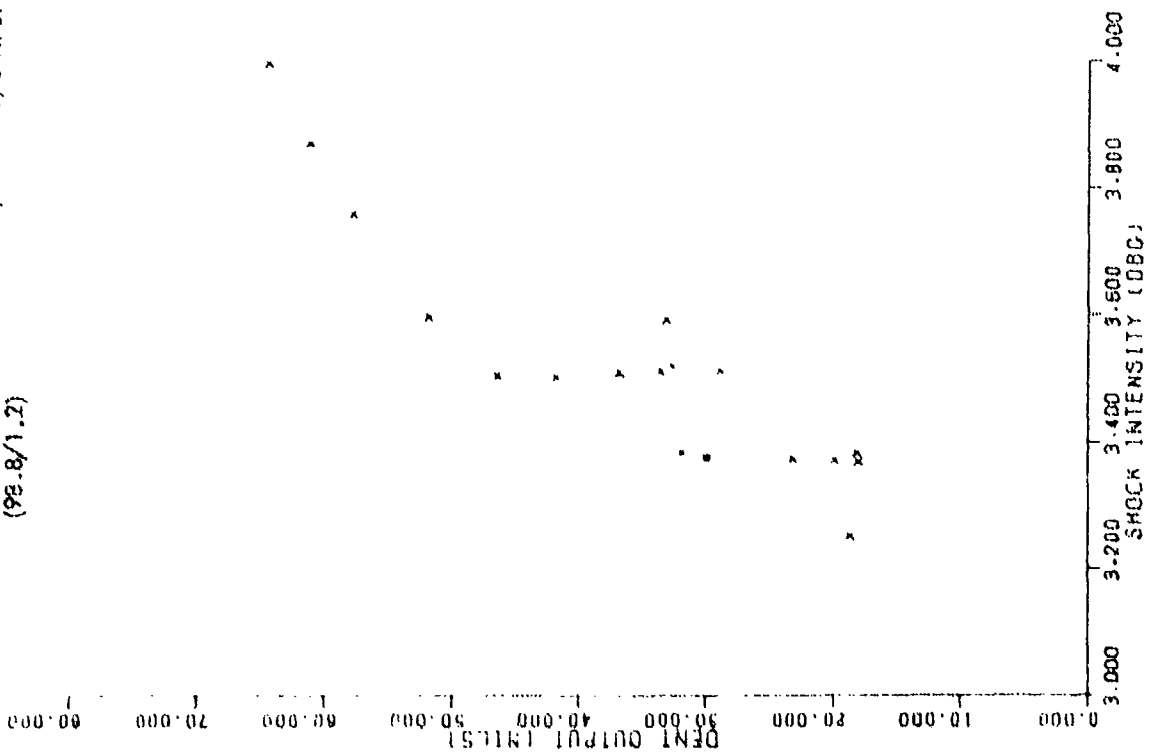
G6d3/G6d4



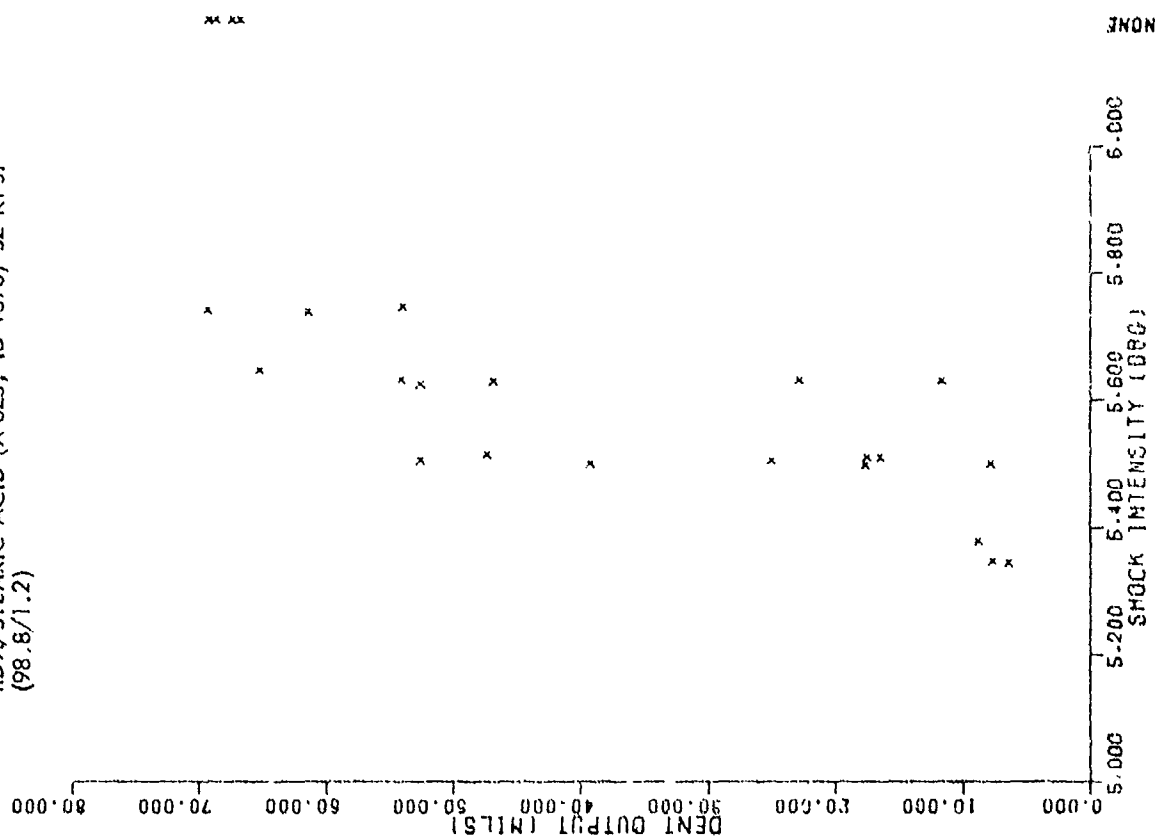
RDX/STEARIC ACID (X 825, ID 1673) 16 KPSI  
(98.8/1.2)



RDX/STEARIC ACID (X 825, ID 1673) 8 KPSI  
(98.8/1.2)

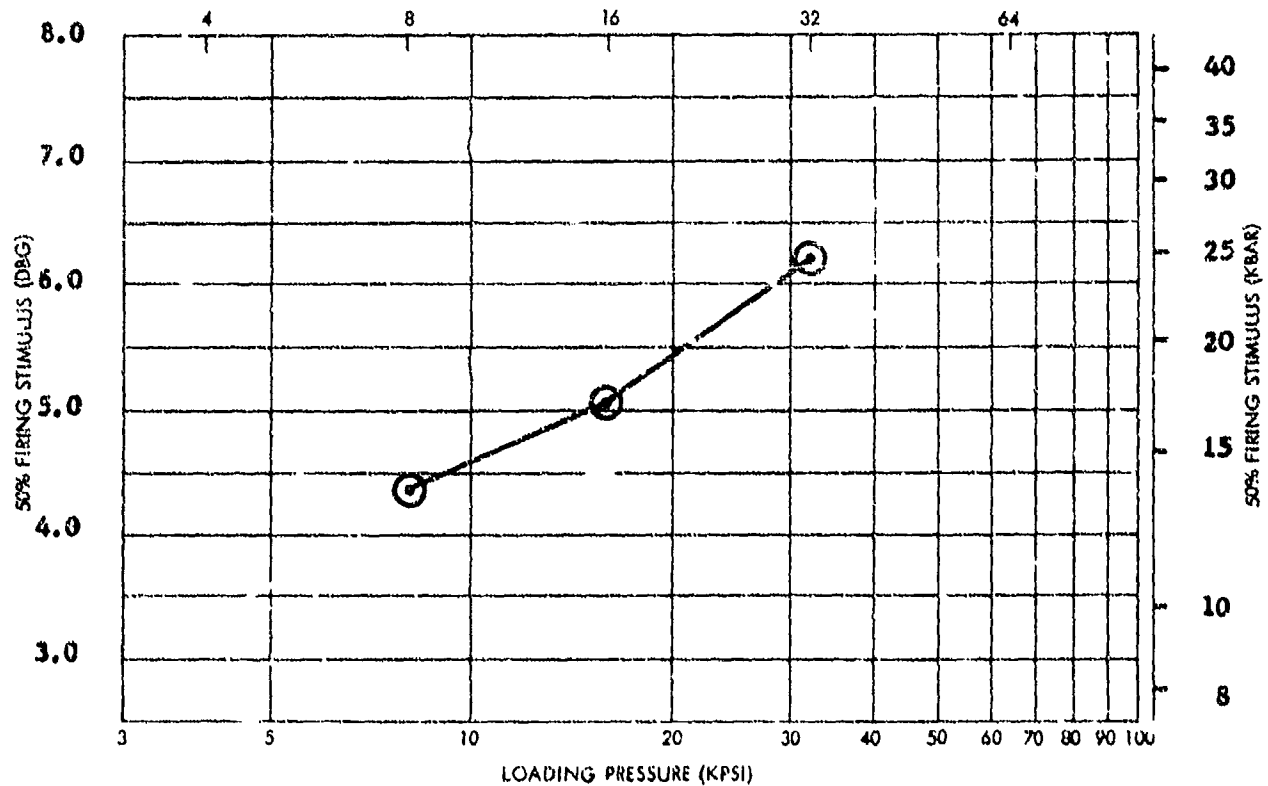


RDH/STEARIC ACID (X 825, ID 1673) 32 KPSI  
(98.8/1.2)



|           |                             |           |             |              |              |
|-----------|-----------------------------|-----------|-------------|--------------|--------------|
| EXPLOSIVE | <b>RDX/ST-AC (96.7/3.3)</b> | X NO.     | <b>826</b>  | Date of Test | <b>11/72</b> |
| TMD       | <b>1.749</b>                | I. D. NO. | <b>1674</b> |              |              |

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD | SENSITIVITY (D8G) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |       | AVG.              | g      | s <sub>m</sub> | N  |         |
| 8                       | 1.589                         | 0.0087 | 90.8  | 4.358             | 0.0554 | 0.0318         | 20 |         |
| 16                      | 1.656                         | 0.0049 | 94.7  | 5.091             | 0.0496 | 0.0290         | 20 |         |
| 32                      | 1.714                         | 0.0039 | 98.0  | 6.228             | 0.0212 | 0.0158         | 20 |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |
|                         |                               |        |       |                   |        |                |    |         |



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/ST-AC (96.7/3.3)

NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Stearic Acid (96.7/3.3)

X NO.: 826      ID: 1674      Z NO.:      SSGT LOAD ORDER NO.: 1379,  
1381

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY: 2 pounds

BATCH NO.: 5, SMUPA, 8616-5

MANUFACTURED BY:

Picatinny Arsenal  
Dover, N. J.

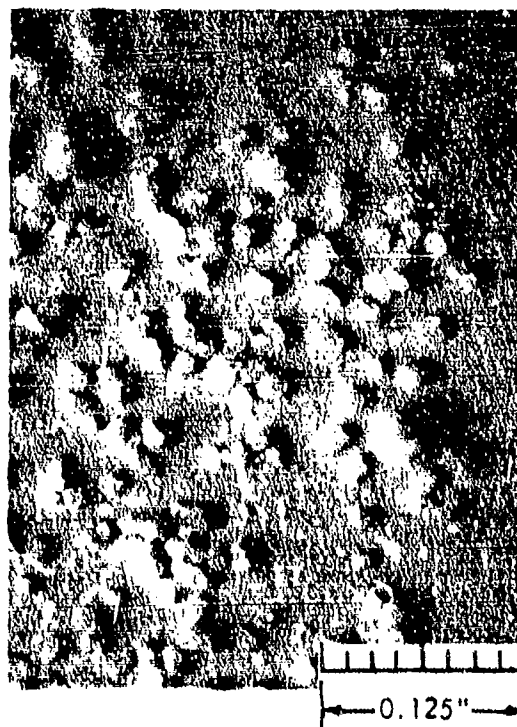
IMPACT SENSITIVITY (% or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\lambda$  =      cm

s =      log units

n =

Remarks

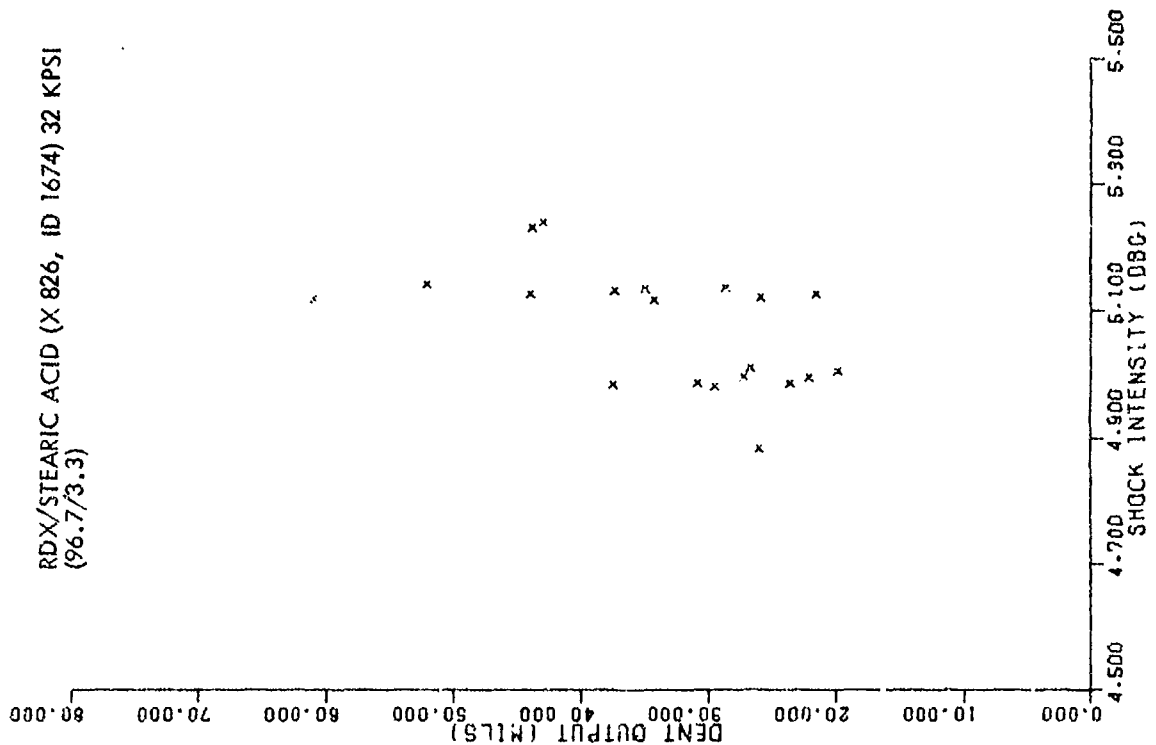


NOLTR 73-132

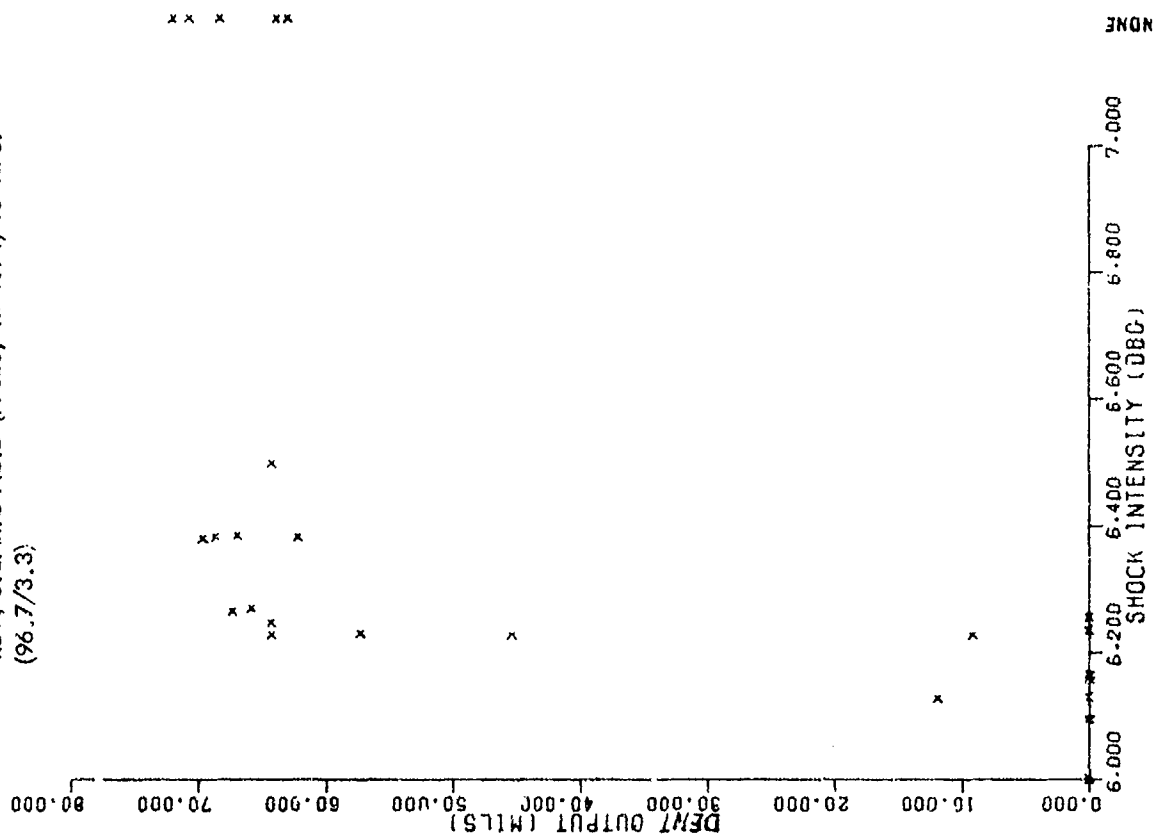
THIS PAGE INTENTIONALLY LEFT BLANK

G6e3/G6e4

RDX/STEARIC ACID (X 826, ID 1674) 32 KPSI  
(96.7/3.3)



RDX/STEARIC ACID (X 826, ID 1674) 16 KPSI  
(96.7/3.3)

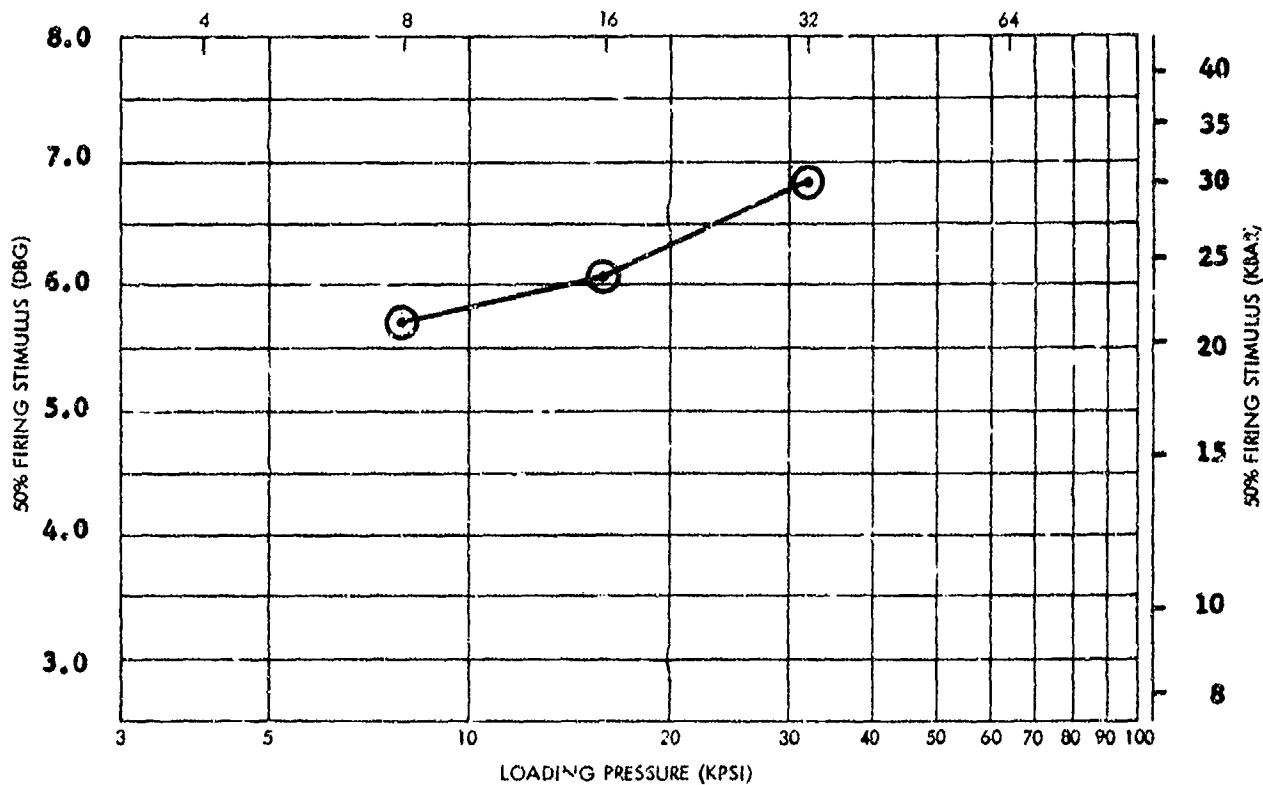


|           |                             |            |             |
|-----------|-----------------------------|------------|-------------|
| EXPLOSIVE | <b>RDX/ST-AC (90.3/9.7)</b> | X NO.      | <b>827</b>  |
| TMD       | <b>1.655</b>                | I. D. N.O. | <b>1675</b> |

Date of Test  
11/72

| LOADING PRESSURE (KPSI) | DENSITY (GM/CM <sup>3</sup> ) |        | % TMD       | SENSITIVITY (DBG) |        |                |    | REMARKS |
|-------------------------|-------------------------------|--------|-------------|-------------------|--------|----------------|----|---------|
|                         | AVG.                          | s      |             | AVG.              | g      | s <sub>m</sub> | N  |         |
| 3                       | 1.577                         | 0.0024 | 95.3        | 5.718             | 0.0215 | 0.0185         | 20 |         |
| 16                      | 1.625                         | 0.0031 | 97.9<br>(1) | 6.026             | 0.0459 | 0.0318         | 20 |         |
| 32                      | 1.659                         | 0.0023 | 100.2       | 6.736             | 0.0220 | 0.0215         | 20 |         |
|                         |                               |        |             |                   |        |                |    |         |
|                         |                               |        |             |                   |        |                |    |         |
|                         |                               |        |             |                   |        |                |    |         |

(1) Experimental error



SMALL SCALE GAP TEST (SSGT) DATA  
RDX/ST-AC (90.3/9.7)



NOLTR 73-132

CHEMICAL DATA

EXPLOSIVE NAME: RDX/Stearic Acid (90.3/9.7)

X NO.: 827

ID: 1675

Z NO.:

SSGT LOAD ORDER NO.: 1379,  
1381

SOURCE:

CHEMICAL NAME:

DATE RECEIVED:

LOT NO.:

INITIAL QUANTITY: 2 pounds

BATCH NO.: 6, SMUPA-IB, 8616-6

MANUFACTURED BY:

Picatinny Arsenal  
Dover, N. J.

IMPACT SENSITIVITY (\$ or 50% point)  
(Type 12 Tools; 2.5 Kg wt; Sandpaper)  
DATE OF TEST

$\bar{x}$  = cm

s = log units

n =

Remarks



G 6 f 2

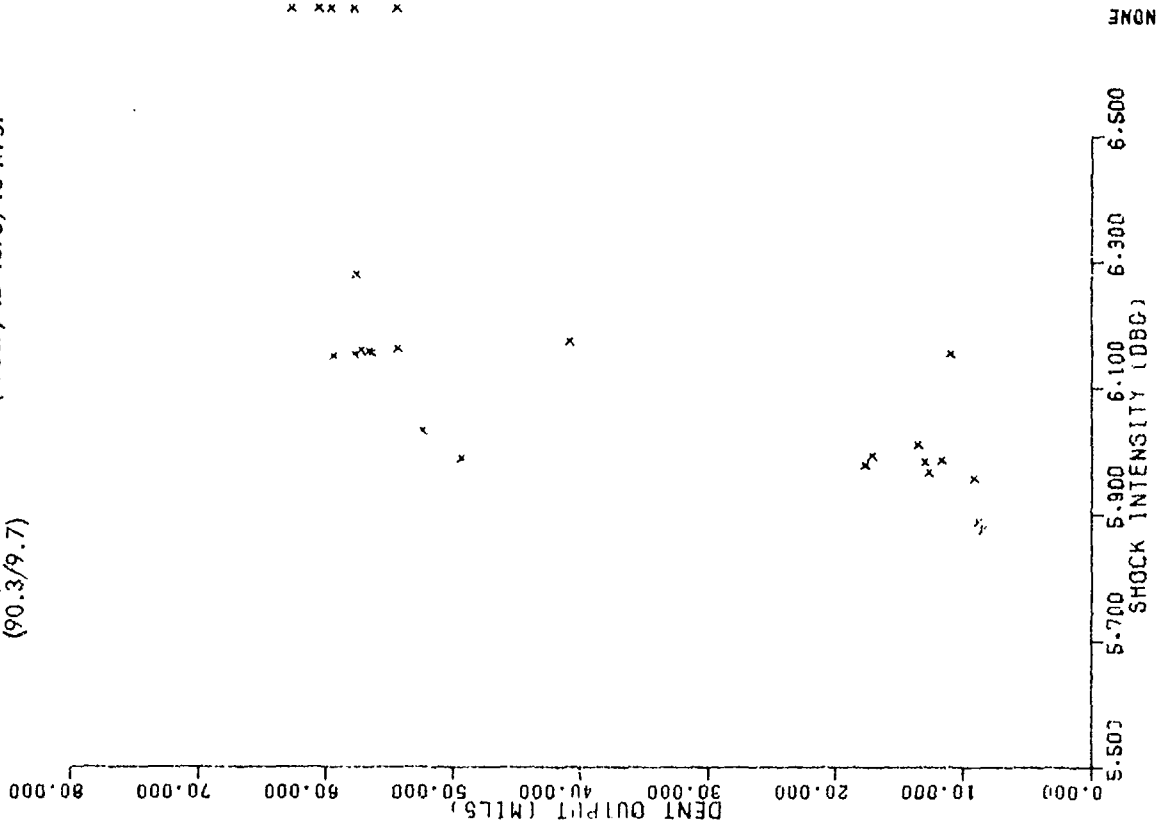
NOLTR 73-132

THIS PAGE INTENTIONALLY LEFT BLANK

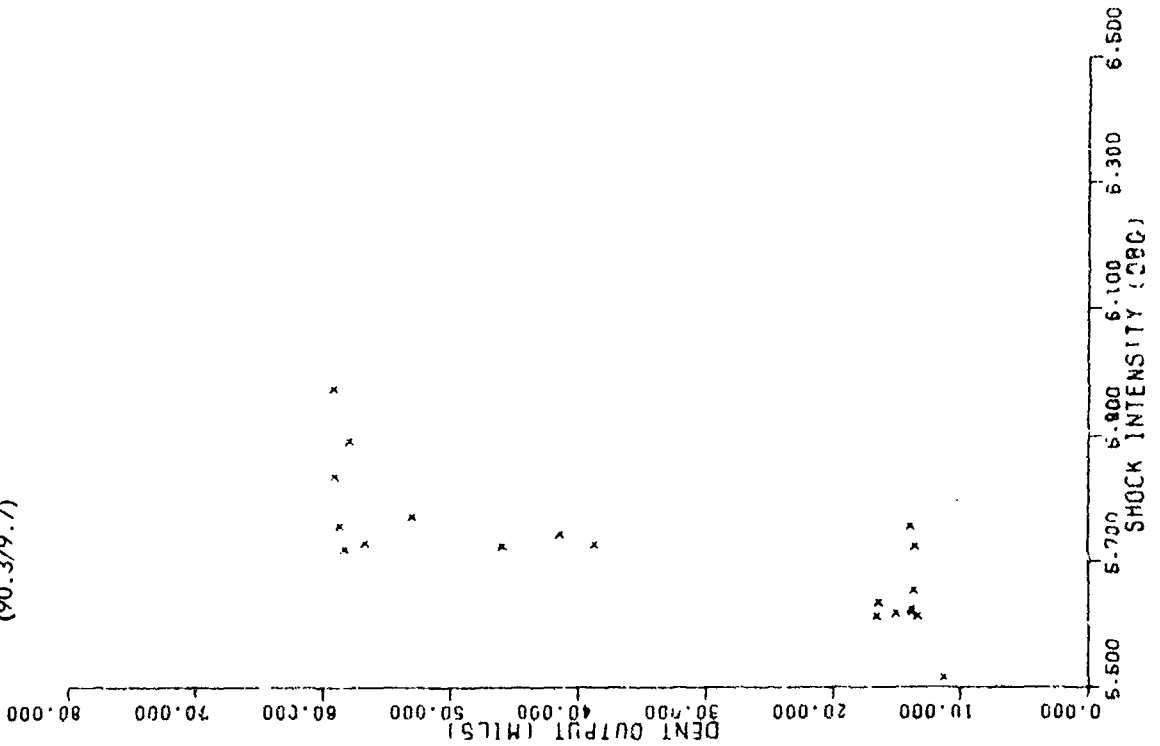
G6f3/G6f4

NOLTR 73-132

RDX/STEARIC ACID (X 827, ID 1675) 16 KPSI  
(90.3/9.7)

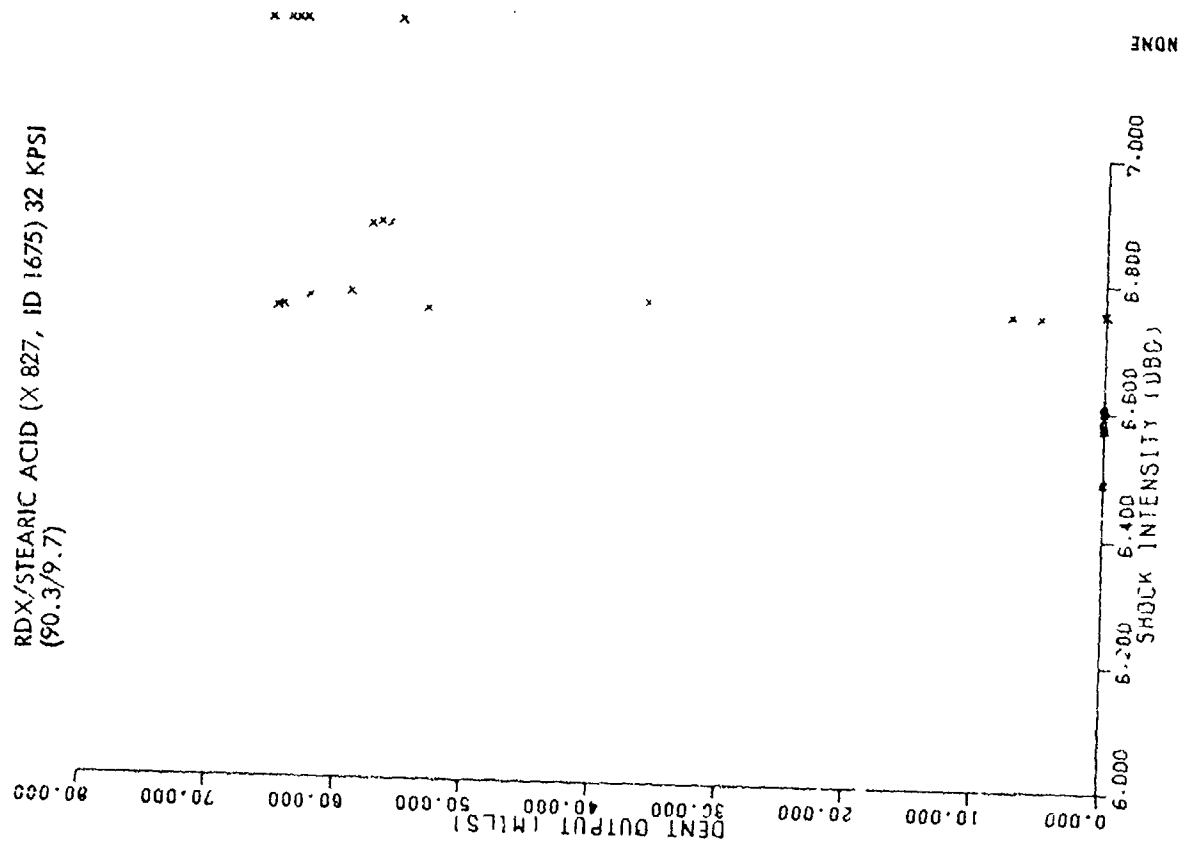


RDX/STEARIC ACID (X 827, ID 1675) 8 KPSI  
(90.3/9.7)



G6f5

RDX/STEARIC ACID (X 827, ID 1675) 32 KPSI  
(90.3/9.7)



- 

- 

- 

- 

-

TABLE H-2 BARRIER THICKNESS (MILS) AS A FUNCTION OF SHOCK STRENGTH FOR DBg RANGE .00 TO 5.99

| SHOCK STRENGTH (DBg) | 0.00  | 0.01  | 0.02  | 0.03  | 0.04  | 0.05  | 0.06  | 0.07  | 0.08  | 0.09  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.00                 | 794.3 | 792.5 | 790.7 | 788.9 | 787.0 | 785.2 | 783.4 | 781.6 | 779.8 | 778.0 |
| 1.10                 | 776.2 | 774.5 | 772.7 | 770.9 | 769.1 | 767.4 | 765.6 | 763.8 | 762.1 | 760.3 |
| 1.20                 | 758.6 | 756.8 | 755.1 | 753.4 | 751.6 | 749.9 | 748.2 | 746.4 | 744.7 | 743.0 |
| 1.30                 | 741.3 | 739.6 | 737.9 | 736.2 | 734.5 | 732.8 | 731.1 | 729.5 | 727.8 | 726.1 |
| 1.40                 | 724.4 | 722.8 | 721.1 | 719.4 | 717.8 | 716.1 | 714.5 | 712.9 | 711.2 | 709.6 |
| 1.50                 | 707.9 | 706.3 | 704.7 | 703.1 | 701.5 | 699.8 | 698.2 | 696.6 | 695.0 | 693.4 |
| 1.60                 | 691.8 | 690.2 | 688.7 | 687.1 | 685.5 | 683.9 | 682.3 | 680.8 | 679.2 | 677.6 |
| 1.70                 | 676.1 | 674.5 | 673.0 | 671.4 | 669.9 | 668.3 | 666.8 | 665.3 | 663.7 | 662.2 |
| 1.80                 | 660.7 | 659.2 | 657.7 | 656.1 | 654.6 | 653.1 | 651.6 | 650.1 | 648.6 | 647.1 |
| 1.90                 | 645.7 | 644.2 | 642.7 | 641.2 | 639.7 | 638.3 | 636.8 | 635.3 | 633.9 | 632.4 |
| 2.00                 | 631.0 | 629.5 | 628.1 | 626.6 | 625.2 | 623.7 | 622.3 | 620.9 | 619.4 | 618.0 |
| 2.10                 | 616.6 | 615.2 | 613.8 | 612.4 | 610.9 | 609.5 | 608.1 | 606.7 | 605.3 | 603.9 |
| 2.20                 | 602.6 | 601.2 | 599.8 | 598.4 | 597.0 | 595.7 | 594.3 | 592.9 | 591.5 | 590.2 |
| 2.30                 | 598.8 | 597.5 | 596.1 | 594.8 | 593.4 | 592.1 | 590.8 | 589.4 | 588.1 | 586.8 |
| 2.40                 | 575.4 | 574.1 | 572.8 | 571.5 | 570.2 | 568.9 | 567.5 | 566.2 | 564.9 | 563.6 |
| 2.50                 | 562.3 | 561.0 | 559.8 | 558.5 | 557.2 | 555.9 | 554.6 | 553.4 | 552.1 | 550.8 |
| 2.60                 | 549.5 | 548.3 | 547.0 | 545.8 | 544.5 | 543.3 | 542.0 | 540.8 | 539.5 | 538.3 |
| 2.70                 | 537.0 | 535.8 | 534.6 | 533.3 | 532.1 | 530.9 | 529.7 | 528.4 | 527.2 | 526.0 |
| 2.80                 | 524.8 | 523.6 | 522.4 | 521.2 | 520.0 | 518.8 | 517.6 | 516.4 | 515.2 | 514.0 |
| 2.90                 | 512.9 | 511.7 | 510.5 | 509.3 | 508.2 | 507.0 | 505.8 | 504.7 | 503.5 | 502.3 |
| 3.00                 | 501.2 | 500.0 | 498.9 | 497.7 | 496.6 | 495.5 | 494.3 | 493.2 | 492.0 | 490.9 |
| 3.10                 | 489.8 | 488.7 | 487.5 | 486.4 | 485.3 | 484.2 | 483.1 | 481.9 | 480.8 | 479.7 |
| 3.20                 | 478.6 | 477.5 | 476.4 | 475.3 | 474.2 | 473.2 | 472.1 | 471.0 | 469.9 | 468.8 |
| 3.30                 | 467.7 | 466.7 | 465.6 | 464.5 | 463.4 | 462.4 | 461.3 | 460.3 | 459.2 | 458.1 |
| 3.40                 | 457.1 | 456.0 | 455.0 | 453.9 | 452.9 | 451.9 | 450.8 | 449.8 | 448.7 | 447.7 |
| 3.50                 | 446.7 | 445.7 | 444.6 | 443.5 | 442.6 | 441.5 | 440.6 | 439.5 | 438.5 | 437.5 |
| 3.60                 | 436.5 | 435.5 | 434.5 | 433.5 | 432.5 | 431.5 | 430.5 | 429.5 | 428.5 | 427.6 |
| 3.70                 | 426.6 | 425.6 | 424.6 | 423.6 | 422.7 | 421.7 | 420.7 | 419.8 | 418.8 | 417.8 |
| 3.80                 | 416.9 | 415.9 | 415.0 | 414.0 | 413.0 | 412.1 | 411.1 | 410.2 | 409.3 | 408.3 |
| 3.90                 | 407.4 | 406.4 | 405.5 | 404.6 | 403.6 | 402.7 | 401.8 | 400.9 | 399.9 | 399.0 |
| 4.00                 | 398.1 | 397.2 | 396.3 | 395.4 | 394.5 | 393.6 | 392.6 | 391.7 | 390.8 | 389.9 |
| 4.10                 | 389.0 | 388.2 | 387.3 | 386.4 | 385.5 | 384.6 | 383.7 | 382.8 | 381.9 | 381.1 |
| 4.20                 | 380.2 | 379.3 | 378.4 | 377.6 | 376.7 | 375.8 | 375.0 | 374.1 | 373.3 | 372.4 |
| 4.30                 | 371.5 | 370.7 | 369.8 | 369.0 | 368.1 | 367.3 | 366.4 | 365.6 | 364.8 | 363.9 |
| 4.40                 | 363.1 | 362.2 | 361.4 | 360.6 | 359.7 | 358.9 | 358.1 | 357.3 | 356.5 | 355.6 |
| 4.50                 | 354.8 | 354.0 | 353.2 | 352.4 | 351.6 | 350.8 | 349.9 | 349.1 | 348.3 | 347.5 |
| 4.60                 | 346.7 | 345.9 | 345.1 | 344.3 | 343.6 | 342.8 | 342.0 | 341.2 | 340.4 | 339.6 |
| 4.70                 | 339.8 | 338.1 | 337.3 | 336.5 | 335.7 | 335.0 | 334.2 | 333.4 | 332.7 | 331.9 |
| 4.80                 | 331.1 | 330.4 | 329.6 | 328.9 | 328.1 | 327.3 | 326.6 | 325.8 | 325.1 | 324.3 |
| 4.90                 | 323.6 | 322.8 | 322.1 | 321.4 | 320.6 | 319.9 | 319.2 | 318.4 | 317.7 | 317.0 |
| 5.00                 | 316.2 | 315.5 | 314.8 | 314.1 | 313.3 | 312.6 | 311.9 | 311.2 | 310.5 | 309.7 |
| 5.10                 | 309.0 | 308.3 | 307.6 | 306.9 | 306.2 | 305.5 | 304.8 | 304.1 | 303.4 | 302.7 |
| 5.20                 | 302.0 | 301.3 | 300.6 | 299.9 | 299.2 | 298.5 | 297.9 | 297.2 | 296.5 | 295.8 |
| 5.30                 | 295.1 | 294.4 | 293.8 | 293.1 | 292.4 | 291.7 | 291.1 | 290.4 | 289.7 | 289.1 |
| 5.40                 | 283.4 | 282.7 | 282.1 | 281.4 | 280.8 | 280.1 | 279.4 | 278.8 | 278.1 | 277.5 |
| 5.50                 | 281.8 | 281.2 | 280.5 | 279.9 | 279.3 | 278.6 | 278.0 | 277.3 | 276.7 | 276.1 |
| 5.60                 | 275.4 | 274.8 | 274.2 | 273.5 | 272.9 | 272.3 | 271.6 | 271.0 | 270.4 | 269.8 |
| 5.70                 | 269.2 | 268.5 | 267.9 | 267.3 | 266.7 | 266.1 | 265.5 | 264.9 | 264.2 | 263.6 |
| 5.80                 | 263.0 | 262.4 | 261.8 | 261.2 | 260.6 | 260.1 | 259.4 | 258.8 | 258.2 | 257.6 |
| 5.90                 | 257.0 | 256.4 | 255.8 | 255.3 | 254.7 | 254.1 | 253.5 | 252.9 | 252.3 | 251.8 |

TABLE H-3 BARRIER THICKNESS (MILS) AS A FUNCTION OF SHOCK STRENGTH FOR DBg RANGE 6.00 TO 10.99

| SHOCK STRENGTH (DBg) | 6.00  | 6.01  | 6.02  | 6.03  | 6.04  | 6.05  | 6.06  | 6.07  | 6.08  | 6.09  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 6.00                 | 251.2 | 250.6 | 250.0 | 249.5 | 248.9 | 248.3 | 247.7 | 247.2 | 246.6 | 246.0 |
| 6.10                 | 245.5 | 244.9 | 244.3 | 243.8 | 243.2 | 242.7 | 242.1 | 241.5 | 241.0 | 240.4 |
| 6.20                 | 239.9 | 239.3 | 238.8 | 238.2 | 237.7 | 237.1 | 236.6 | 236.0 | 235.5 | 235.0 |
| 6.30                 | 234.4 | 233.9 | 233.3 | 232.8 | 232.3 | 231.7 | 231.2 | 230.7 | 230.1 | 229.6 |
| 6.40                 | 229.1 | 228.6 | 228.0 | 227.5 | 227.0 | 226.5 | 225.9 | 225.4 | 224.9 | 224.4 |
| 6.50                 | 223.9 | 223.4 | 222.8 | 222.3 | 221.8 | 221.3 | 220.8 | 220.3 | 219.8 | 219.3 |
| 6.60                 | 218.8 | 218.3 | 217.8 | 217.3 | 216.8 | 216.3 | 215.8 | 215.3 | 214.8 | 214.3 |
| 6.70                 | 213.8 | 213.3 | 212.8 | 212.3 | 211.8 | 211.3 | 210.8 | 210.4 | 209.9 | 209.4 |
| 6.80                 | 208.9 | 208.4 | 207.9 | 207.5 | 207.0 | 206.5 | 206.1 | 205.6 | 205.1 | 204.6 |
| 6.90                 | 204.2 | 203.7 | 203.2 | 202.8 | 202.3 | 201.8 | 201.4 | 200.9 | 200.4 | 200.0 |
| 7.00                 | 199.5 | 199.1 | 198.6 | 198.2 | 197.7 | 197.2 | 196.8 | 196.3 | 195.9 | 195.4 |
| 7.10                 | 195.0 | 194.5 | 194.1 | 193.6 | 193.2 | 192.8 | 192.3 | 191.9 | 191.4 | 191.0 |
| 7.20                 | 190.5 | 190.1 | 189.7 | 189.2 | 188.8 | 188.4 | 187.9 | 187.5 | 187.1 | 186.6 |
| 7.30                 | 186.2 | 185.8 | 185.4 | 184.9 | 184.5 | 184.1 | 183.7 | 183.2 | 182.8 | 182.4 |
| 7.40                 | 182.0 | 181.6 | 181.1 | 180.7 | 180.3 | 179.9 | 179.5 | 179.1 | 178.6 | 178.2 |
| 7.50                 | 177.8 | 177.4 | 177.0 | 176.6 | 176.2 | 175.8 | 175.4 | 175.0 | 174.6 | 174.2 |
| 7.60                 | 173.8 | 173.4 | 173.0 | 172.6 | 172.2 | 171.8 | 171.4 | 171.0 | 170.6 | 170.2 |
| 7.70                 | 169.8 | 169.4 | 169.0 | 168.7 | 168.3 | 167.9 | 167.5 | 167.1 | 166.7 | 166.3 |
| 7.80                 | 166.0 | 165.6 | 165.2 | 164.8 | 164.4 | 164.1 | 163.7 | 163.3 | 162.9 | 162.6 |
| 7.90                 | 162.2 | 161.8 | 161.4 | 161.1 | 160.7 | 160.3 | 160.0 | 159.6 | 159.2 | 158.9 |
| 8.00                 | 158.5 | 158.1 | 157.8 | 157.4 | 157.0 | 156.7 | 156.3 | 156.0 | 155.6 | 155.2 |
| 8.10                 | 154.7 | 154.5 | 154.2 | 153.8 | 153.5 | 153.1 | 152.8 | 152.4 | 152.1 | 151.7 |
| 8.20                 | 151.4 | 151.0 | 150.7 | 150.3 | 150.0 | 149.6 | 149.3 | 148.9 | 148.6 | 148.3 |
| 8.30                 | 147.9 | 147.6 | 147.2 | 146.9 | 146.6 | 146.2 | 145.9 | 145.5 | 145.2 | 144.9 |
| 8.40                 | 144.5 | 144.2 | 143.9 | 143.5 | 143.2 | 142.9 | 142.6 | 142.2 | 141.9 | 141.6 |
| 8.50                 | 141.3 | 140.9 | 140.6 | 140.3 | 140.0 | 139.6 | 139.3 | 139.0 | 138.7 | 138.4 |
| 8.60                 | 138.0 | 137.7 | 137.4 | 137.1 | 136.8 | 136.5 | 136.1 | 135.8 | 135.5 | 135.2 |
| 8.70                 | 134.9 | 134.6 | 134.3 | 134.0 | 133.7 | 133.4 | 133.0 | 132.7 | 132.4 | 132.1 |
| 8.80                 | 131.8 | 131.5 | 131.2 | 130.9 | 130.6 | 130.3 | 130.0 | 129.7 | 129.4 | 129.1 |
| 8.90                 | 128.8 | 128.5 | 128.2 | 127.9 | 127.6 | 127.4 | 127.1 | 126.8 | 126.5 | 126.2 |
| 9.00                 | 125.9 | 125.6 | 125.3 | 125.0 | 124.7 | 124.5 | 124.2 | 123.9 | 123.6 | 123.3 |
| 9.10                 | 123.0 | 122.7 | 122.5 | 122.2 | 121.9 | 121.6 | 121.3 | 121.1 | 120.8 | 120.5 |
| 9.20                 | 120.2 | 119.9 | 119.7 | 119.4 | 119.1 | 118.9 | 118.6 | 118.3 | 118.0 | 117.8 |
| 9.30                 | 117.5 | 117.2 | 116.9 | 116.7 | 116.4 | 116.1 | 115.9 | 115.6 | 115.3 | 115.1 |
| 9.40                 | 114.8 | 114.6 | 114.3 | 114.0 | 113.8 | 113.5 | 113.2 | 113.0 | 112.7 | 112.5 |
| 9.50                 | 112.2 | 111.9 | 111.7 | 111.4 | 111.2 | 110.9 | 110.7 | 110.4 | 110.2 | 109.9 |
| 9.60                 | 109.6 | 109.4 | 109.1 | 108.9 | 108.6 | 108.4 | 108.1 | 107.9 | 107.6 | 107.4 |
| 9.70                 | 107.2 | 106.9 | 106.7 | 106.4 | 106.2 | 105.9 | 105.7 | 105.4 | 105.2 | 105.0 |
| 9.80                 | 104.7 | 104.5 | 104.2 | 104.0 | 103.8 | 103.5 | 103.3 | 103.0 | 102.8 | 102.6 |
| 9.90                 | 102.3 | 102.1 | 101.9 | 101.6 | 101.4 | 101.2 | 100.9 | 100.7 | 100.5 | 100.2 |
| 10.00                | 100.0 | 99.8  | 99.5  | 99.3  | 99.1  | 98.9  | 98.6  | 98.4  | 98.2  | 97.9  |
| 10.10                | 97.7  | 97.5  | 97.3  | 97.1  | 96.8  | 96.6  | 96.4  | 96.2  | 95.9  | 95.7  |
| 10.20                | 95.5  | 95.3  | 95.1  | 94.8  | 94.6  | 94.4  | 94.2  | 94.0  | 93.8  | 93.5  |
| 10.30                | 93.3  | 93.1  | 92.9  | 92.7  | 92.5  | 92.3  | 92.0  | 91.8  | 91.6  | 91.4  |
| 10.40                | 91.2  | 91.0  | 90.8  | 90.6  | 90.4  | 90.2  | 89.9  | 89.7  | 89.5  | 89.3  |
| 10.50                | 89.1  | 88.9  | 88.7  | 88.5  | 88.3  | 88.1  | 87.9  | 87.7  | 87.5  | 87.3  |
| 10.60                | 87.1  | 86.9  | 86.7  | 86.5  | 86.3  | 86.1  | 85.9  | 85.7  | 85.5  | 85.3  |
| 10.70                | 85.1  | 84.9  | 84.7  | 84.5  | 84.3  | 84.1  | 83.9  | 83.8  | 83.6  | 83.4  |
| 10.80                | 83.2  | 83.0  | 82.8  | 82.6  | 82.4  | 82.2  | 82.0  | 81.8  | 81.7  | 81.5  |
| 10.90                | 81.3  | 81.1  | 80.9  | 80.7  | 80.5  | 80.4  | 80.2  | 80.0  | 79.8  | 79.6  |

TABLE H-4 BARRIER THICKNESS (MILS) AS A FUNCTION OF SHOCK STRENGTH FOR DBg RANGE -4.0 TO +14.9

| SHOCK STRENGTH (DBg) | -4.0   | -3.0   | -2.0   | -1.0   | 0.0    | 0.1    | 0.2    | 0.3    | 0.4    | 0.5    | 0.6 | 0.7 | 0.8 | 0.9 |
|----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|-----|-----|-----|
| -4.0                 | 2531.9 | 2571.4 | 2630.3 | 2671.5 | 2754.2 | 2818.4 | 2886.0 | 2951.2 | 3020.0 | 3090.3 |     |     |     |     |
| -3.0                 | 1945.3 | 2141.7 | 2084.3 | 2133.0 | 2187.4 | 2238.7 | 2290.4 | 2344.2 | 2399.8 | 2454.7 |     |     |     |     |
| -2.0                 | 1554.9 | 1621.8 | 1651.6 | 1698.7 | 1737.8 | 1774.3 | 1812.7 | 1862.1 | 1905.5 | 1947.8 |     |     |     |     |
| -1.0                 | 1253.9 | 1284.2 | 1314.3 | 1349.0 | 1380.4 | 1412.5 | 1445.4 | 1479.1 | 1513.6 | 1548.8 |     |     |     |     |
| 0.0                  | 1000.0 | 1023.3 | 1047.1 | 1071.5 | 1096.5 | 1122.0 | 1148.2 | 1174.9 | 1202.3 | 1230.3 |     |     |     |     |
| 0.0                  | 1300.0 | 477.2  | 258.6  | 93.3   | 412.0  | 491.3  | 471.0  | 451.1  | 431.4  | 412.4  |     |     |     |     |
| 1.0                  | 174.3  | 178.2  | 758.6  | 741.3  | 724.4  | 707.4  | 691.8  | 676.1  | 660.7  | 645.7  |     |     |     |     |
| 2.0                  | 631.0  | 616.6  | 602.6  | 588.8  | 575.4  | 562.3  | 549.5  | 537.0  | 524.8  | 512.7  |     |     |     |     |
| 3.0                  | 521.2  | 480.4  | 478.6  | 467.7  | 457.1  | 446.7  | 436.5  | 426.6  | 416.9  | 407.4  |     |     |     |     |
| 4.0                  | 394.1  | 380.0  | 381.2  | 371.5  | 363.1  | 354.8  | 346.7  | 338.8  | 331.1  | 323.4  |     |     |     |     |
| 5.0                  | 316.2  | 309.0  | 302.0  | 295.1  | 288.4  | 281.8  | 275.4  | 269.2  | 263.0  | 257.0  |     |     |     |     |
| 6.0                  | 251.2  | 245.5  | 239.4  | 234.4  | 229.1  | 223.9  | 218.8  | 213.8  | 208.9  | 204.2  |     |     |     |     |
| 7.0                  | 199.5  | 195.0  | 190.5  | 186.2  | 182.0  | 177.8  | 173.8  | 169.8  | 166.0  | 162.2  |     |     |     |     |
| 8.0                  | 154.5  | 154.9  | 151.4  | 147.9  | 144.5  | 141.3  | 138.0  | 134.9  | 131.8  | 128.8  |     |     |     |     |
| 9.0                  | 125.9  | 123.0  | 120.2  | 117.5  | 114.8  | 112.2  | 109.6  | 107.2  | 104.7  | 102.3  |     |     |     |     |
| 10.0                 | 100.0  | 97.7   | 95.5   | 93.3   | 91.2   | 89.1   | 87.1   | 85.1   | 83.2   | 81.3   |     |     |     |     |
| 11.0                 | 79.4   | 77.6   | 75.9   | 74.1   | 72.4   | 70.8   | 69.2   | 67.6   | 66.1   | 64.6   |     |     |     |     |
| 12.0                 | 63.1   | 61.7   | 60.3   | 58.9   | 57.5   | 56.2   | 55.0   | 53.7   | 52.5   | 51.3   |     |     |     |     |
| 13.0                 | 50.1   | 49.0   | 47.9   | 46.8   | 45.7   | 44.7   | 43.7   | 42.7   | 41.7   | 40.7   |     |     |     |     |
| 14.0                 | 39.9   | 38.9   | 38.0   | 37.2   | 36.3   | 35.5   | 34.7   | 33.9   | 33.1   | 32.4   |     |     |     |     |



TABLE H-5 DETAILED TABLE OF PROBABILITIES AS A FUNCTION OF THE LOGISTIC VARIATE,  $L$ 

| $L$  | 0.0         | 0.1         | 0.2         | 0.3         | 0.4         | 0.5         | 0.6         | 0.7         | 0.8         | 0.9         |
|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| -19. | .00000056   | .00000051   | .00000044   | .00000037   | .00000030   | .00000023   | .00000016   | .00000010   | .00000005   | .00000003   |
| -18. | .00000152   | .00000134   | .00000125   | .00000113   | .00000102   | .00000092   | .00000082   | .00000073   | .00000064   | .00000056   |
| -17. | .00000414   | .00000375   | .00000337   | .00000307   | .00000278   | .00000251   | .00000227   | .00000204   | .00000184   | .00000169   |
| -16. | .00001125   | .00001018   | .00000921   | .00000834   | .00000754   | .00000683   | .00000614   | .00000550   | .00000494   | .00000445   |
| -15. | .00003059   | .00002768   | .00002505   | .00002267   | .00002051   | .00001855   | .00001677   | .00001519   | .00001375   | .00001244   |
| -14. | .00008315   | .00007524   | .00006838   | .00006160   | .00005574   | .00005043   | .00004544   | .00004079   | .00003635   | .00003211   |
| -13. | .00022673   | .00020452   | .00018504   | .00016745   | .00015151   | .00013719   | .00012455   | .00011324   | .00010316   | .00009419   |
| -12. | .00061442   | .00055595   | .00050334   | .00045517   | .00041166   | .00037266   | .00033727   | .00030511   | .00027588   | .00024943   |
| -11. | .00157014   | .00151121   | .00136743   | .00123728   | .00111954   | .00101300   | .00091640   | .00082934   | .00075045   | .00067904   |
| -10. | .00433979   | .00410779   | .00371649   | .00327320   | .00278431   | .00225357   | .00169154   | .00112277   | .00056189   | .000014579  |
| -9.  | .01233946   | .01116533   | .01013022   | .00914159   | .008227172  | .00745642   | .00677721   | .00617297   | .00564485   | .00517722   |
| -8.  | .03353971   | .03234470   | .03124522   | .03024551   | .02934278   | .02854278   | .02784278   | .02724278   | .02674278   | .02634278   |
| -7.  | .09117512   | .08924487   | .08745249   | .08579827   | .08427786   | .08287786   | .08157786   | .08037786   | .07927786   | .07827786   |
| -6.  | .26724732   | .26378445   | .26053204   | .25748240   | .25462811   | .25195200   | .24945200   | .24712786   | .24497786   | .24297786   |
| -5.  | .66928559   | .66598815   | .66284817   | .65986817   | .65704732   | .65437732   | .65184732   | .64944732   | .64717732   | .64502732   |
| -4.  | 1.70822100  | 1.63024994  | 1.47747317  | 1.33653172  | 1.21234750  | 1.09686266  | .98518219   | .88132987   | .79125712   | .7301413    |
| -3.  | 4.74248732  | 4.31775549  | 3.91657224  | 3.53711493  | 3.17954647  | 2.84222388  | 2.53499316  | 2.25770214  | 2.01127786  | 1.79437786  |
| -2.  | 11.02728220 | 10.0068812  | 9.07504891  | 8.23275410  | 7.48174945  | 6.82455288  | 6.25184732  | 5.76273361  | 5.35731753  | 5.0253631   |
| -1.  | 24.09414714 | 24.07306944 | 23.13752145 | 21.31450170 | 19.78111114 | 18.24555288 | 16.70814149 | 15.26852651 | 14.01847742 | 13.01847742 |
| 0.   | 51.00000000 | 47.50000000 | 45.01460027 | 42.55574832 | 40.13123399 | 37.74466488 | 35.40347278 | 33.10122278 | 31.00255189 | 29.00503974 |
| 1.   | 50.00000000 | 52.40701875 | 54.98334971 | 57.64422169 | 59.36076601 | 62.24359312 | 64.55633362 | 66.81977722 | 68.90744811 | 71.09495776 |
| 2.   | 73.11555786 | 75.02011066 | 76.65247335 | 78.03444337 | 80.21815336 | 81.75743789 | 83.20183951 | 84.56377349 | 85.81189351 | 86.94337395 |
| 3.   | 96.25731788 | 98.00071788 | 99.02495109 | 99.88778290 | 99.68933335 | 92.14182789 | 93.00415397 | 93.70266479 | 94.26156231 | 94.7844769  |
| 4.   | 98.20137800 | 98.36075006 | 98.52253483 | 98.64137022 | 98.72715650 | 98.80130574 | 97.36030344 | 97.58727894 | 97.81177391 | 98.01584243 |
| 5.   | 98.33071491 | 98.35010845 | 98.45137011 | 98.50371023 | 98.55077268 | 98.59289423 | 98.63157801 | 98.66651927 | 98.69815937 | 98.72888732 |
| 6.   | 98.75271788 | 98.77271515 | 98.78771786 | 98.81577411 | 98.83411789 | 98.84988177 | 98.86414800 | 98.87776814 | 98.88984440 | 98.89922902 |
| 7.   | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 8.   | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 9.   | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 10.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 11.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 12.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 13.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 14.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 15.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 16.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 17.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 18.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |
| 19.  | 99.00000000 | 99.01255753 | 99.02533712 | 99.03849173 | 99.05191276 | 99.06472214 | 99.07693889 | 99.08874774 | 99.09944394 | 99.09999329 |